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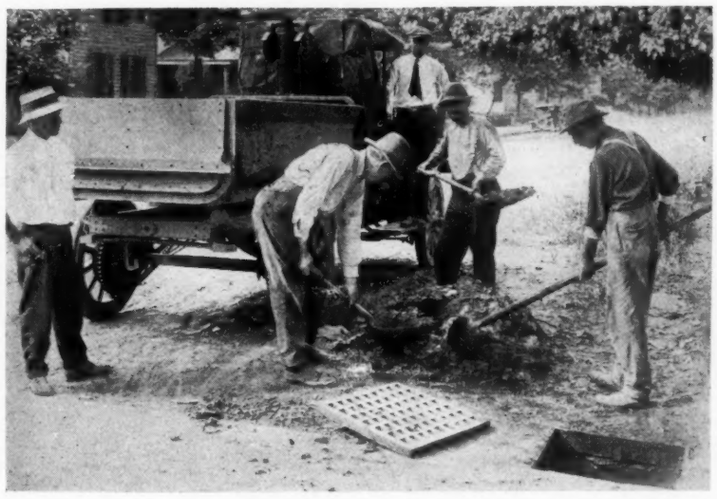

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Cuts Out All Wheelers

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—and the Koehring boom and bucket distribution is another big extra yardage feature. It gives the greatest distributing range without moving the mixer—and the saving of every mixer move is a gain in yardage. It handles any consistency of concrete on any grade with the positive speed of power drive. Because of the automatic actions of the boom and bucket and of the Koehring mixer itself, it means one-man mixer control without any sacrifice of top speed operation, gives full benefit of Koehring high speed charging skip, liberal drum dimensions and fast discharge. And the Koehring has the heavy duty construction to give the greatest possible safety margin against breakdowns and costly delays. Buy your next mixer on yardage ability—and send for the broadminded Koehring catalog and prepare yourself to judge mixers on actual yardage capacity. Ask for catalog 1-E.

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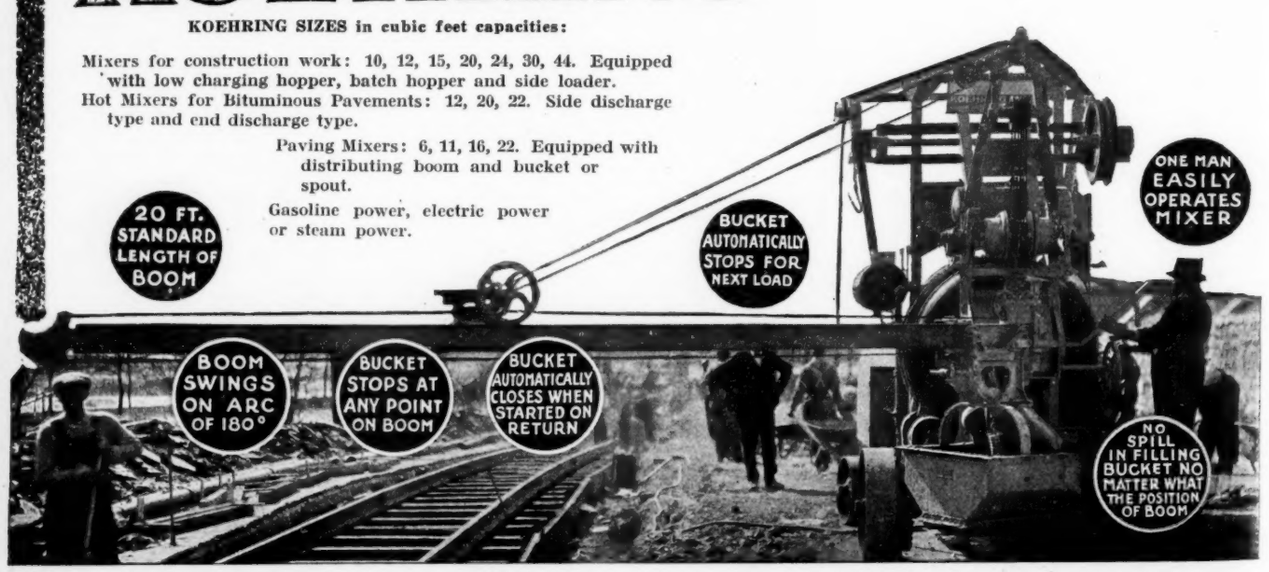
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BUCKET STOPS AT ANY POINT ON BOOM
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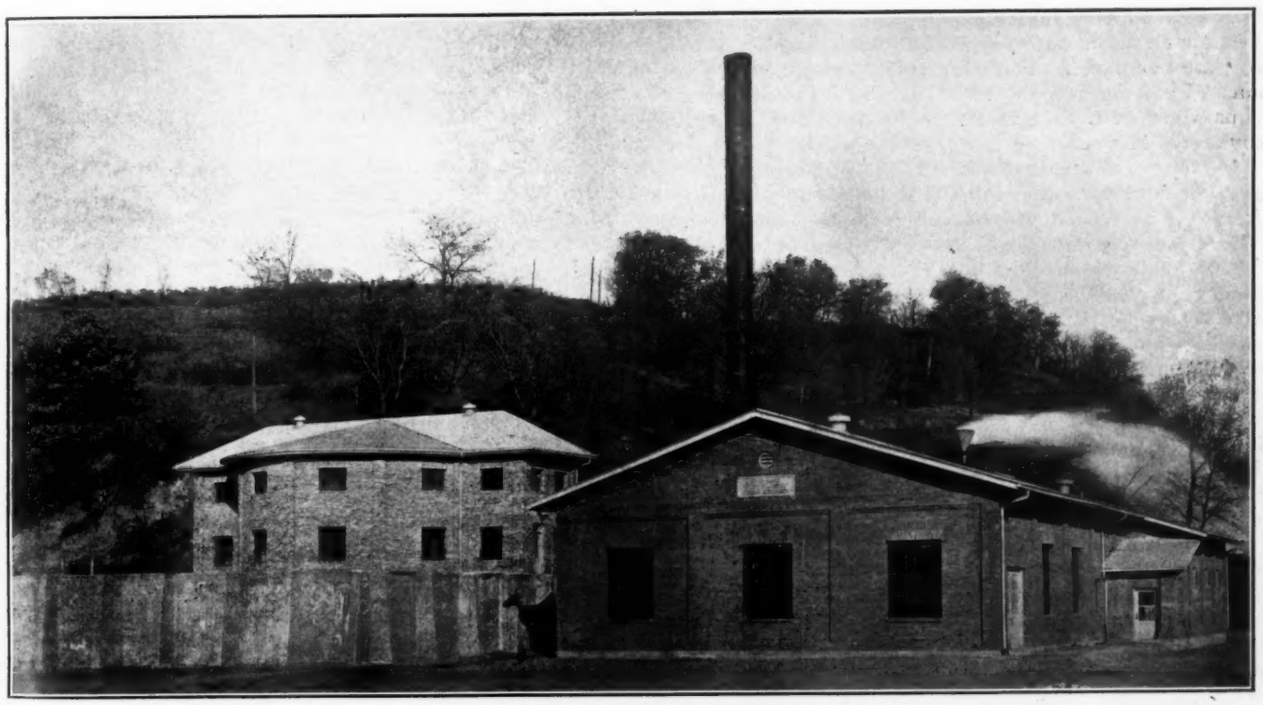
NO SPILL IN FILLING BUCKET NO MATTER WHAT THE POSITION OF BOOM

Municipal Journal

Volume XLIV. NEW YORK, APRIL 13, 1918 No. 15

RECONSTRUCTING WATER PLANT WITHOUT INTERRUPTING SERVICE

Fort Madison, Iowa, Replaces Old Pumps, Boilers and Buildings with New, One Item at a Time—Also Builds Storage Reservoir and Filtration Plant, and New Ri ver Intake.



FORT MADISON'S NEW WATER WORKS PLANT.
Pumping station and coal storage on the right; settling basin, filter house and head house on the left.

The building of a new water works plant on the exact site of an old plant, and entirely removing every vestige of material and equipment of the old plant and replacing it with new, and without interruption of service, calls for an unusually close study of the engineering features and a careful handling of the construction work and material. It is not an unusual thing to replace an old steel bridge with a new one without interfering with traffic, but in bridge work you at least have a few minutes interval between trains; but in supplying a community of fifteen thousand people with continuous water service, a single interruption, even for a minute, not only jeopardizes the property of the city, but the safety of the citizens as well.

Many municipalities and water companies hesitate about carrying out improvements because of the fear of interruption of service and the criticism that this interruption might bring. However, in the case of the Fort Madison, Iowa, water works, criticism had already reached an alarming stage because of the quality of the water and insufficiency of the fire pressure, and it became incumbent upon the city to provide a more satisfactory water and a better fire service. The city was without bond power to provide for a municipal plant, consequently twenty-five of the leading citizens organized the "Citizens' Corporation," which was granted a franchise, and they immediately took over the old property and began the reconstruction of the entire water works plant, involving an expenditure of about three hundred thousand dollars. The criticism and suspicion arising from the operation of the old plant was a lesson which caused the new corporation to exert every effort to avoid the errors of the past and to rescue, if possible, an unprofitable business and to adopt measures of economy and efficiency that would make the new project profitable. The consulting engineers, in preparing the plans and specifications for machinery and equipment for the pumping plant, power plant and filtration system kept in mind the previous unprofitable business and exerted every effort to provide an equipment that would not only give the very best of service but do this at a minimum of expense.

The old station, like many of the early-day water

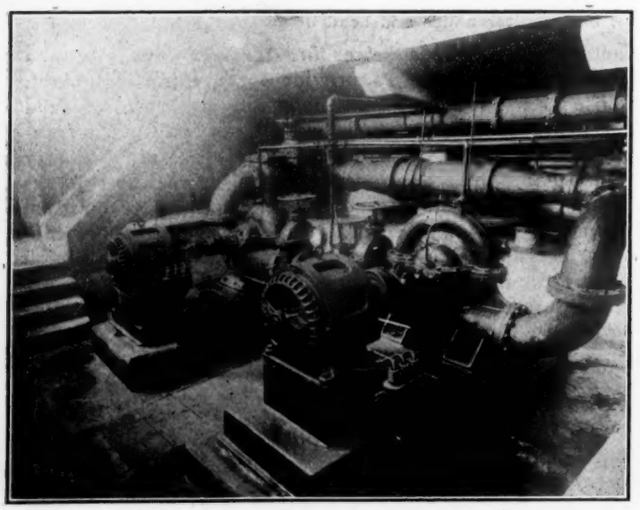
works plants, contained pumping machinery that was obsolete—a power plant that was merely a fuel consumer, with no check on the wastage of water; and, with frequent changes of ownership and management, a sorry condition existed. The old station contained two high-service pumps, but examination disclosed the fact that only one was in condition to be operated.

As the first feature of the reconstruction, the old brick building was torn down around the old pumps and boilers, all equipment was covered with canvas and excavation started for the new structure. Unfortunately it was impossible to select weather suitable for the work, and practically the entire construction work was carried on throughout severe winter weather. In making the excavation for the new structure, it was necessary to take up the old discharge lines from the pumping plant, replacing them with temporary connections.

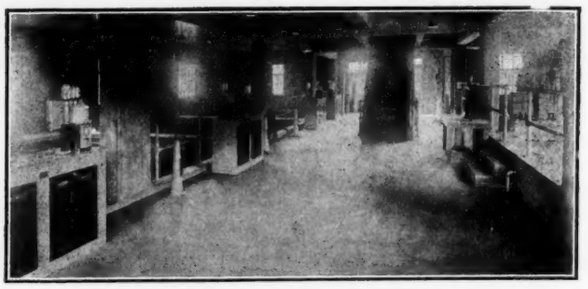
The first work started and completed was a million-gallon reinforced concrete storage reservoir, thus enabling some storage of water in case of interruptions in operation of the pumping equipment. One old boiler was discontinued and displaced; foundations were built and the new boiler was then erected and put in commission. Then the second old boiler was removed, foundations were built for the second boiler which was then connected and enclosed in new steel casing.

A temporary smoke stack was built, using old corrugated iron culverts and supported above the boilers by a frame of structural steel taken from the old building. The temporary stack was held in place by guy wires placed at such height as not to interfere later with the placing of roof trusses and other building operations. A complete new stack was then erected, and as soon as the new boilers were placed the new breeching was put in place and connected to the new stack. During the time these changes were being made the building was being constructed and firemen, engineers and operators had to be protected by canvas covers stretched over a frame-work over the boilers and pumps; but in spite of the severe winter weather, this work was carried on without interruption.

In the pump room a new concrete foundation was erected and the new pump was set in place. New steam connections were made at once and the old pump was removed by dynamite, since, having seen some thirty-two years of service and having been welded together twice to keep it running, it was not considered valuable enough to save. Fortunately, the new pump had all of its connections completed and was just ready to be placed in service when suddenly the old pump gave up its struggle and practically went to pieces like The Wonderful One-Horse Shay—"all at once and nothing first—just as bubbles do when they burst." Steam was turned into the new pump immediately after the collapse of the old pump and continuous service was maintained with scarcely an interruption except for a few minutes for adjustments to the new pump.



TWO LOW-SERVICE PUMPS, DELIVERING WATER TO SETTLING BASINS AND FILTERS.



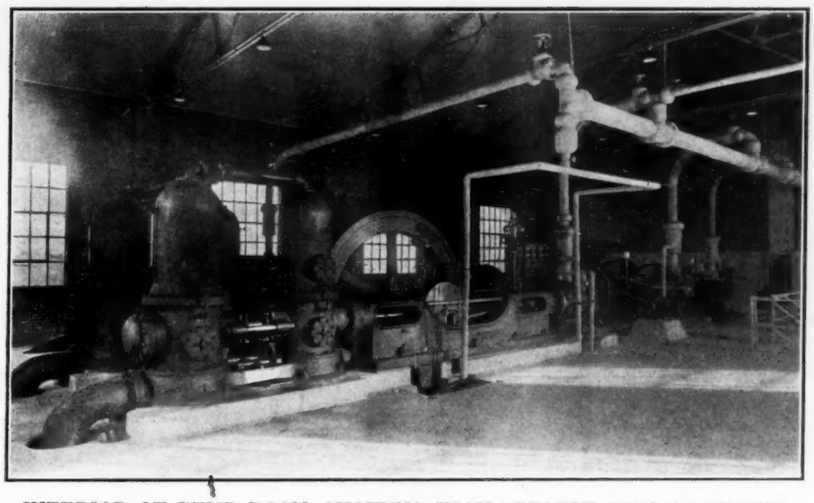
INTERIOR OF FILTER HOUSE.
Filters and operating stands on the left.

The new high-service pump is a three-million gallon Corliss fly-wheel, which, owing to its high efficiency, is kept in operation continuously, there being reserved for emergency a three-million gallon duplex pump whose efficiency is less and the first cost investment in which is less. The low-service pumps are motor driven and are in duplicate, consisting of two three-million gallon units, delivering water from the intake in the Mississippi river into concrete-lined basins, from which the water flows through four three-quarter-million gallon capacity mechanical filter units. Duplicate generating units generate the electricity for the operation of the low-service pumps; also furnish power for the operation of the blower and wash water pump used in the filter house, besides furnishing electricity for lighting the entire water works installation and grounds.

The power plant of any water works installation can be a money-maker or a money-loser, depending upon its efficiency; and in this installation equipment was provided to secure the highest efficiency. All the coal is weighed on permanent scales, and the boiler feed water is weighed with automatic recording devices that determine the amount of water evaporated for the amount of coal used. Thus a constant check is obtained at all times on the amount of steam that is produced by a given amount of coal, and the ability and industriousness of each fireman is readily ascertained by these records, which are so arranged as to tell at a glance the record day by day or from year to year, as to the amount of coal consumed, amount of water evaporated, amount of water pumped and the fuel cost per thousand gallons. If the record of a fireman one month is not as good as a previous month, merely a glance will determine this and a good excuse must be forthcoming by the superintendent; otherwise a new fireman takes the job.

A new intake was built into the Mississippi river, this being necessary because the building of the Keokuk dam had raised the level of the water in the river at Fort Madison about fifteen feet and it was desirable to have the new intake placed considerably above the bottom of the river bed in order to avoid drawing in the sediment that will undoubtedly accumulate.

All the water is metered in passing from the low service pumps to the filtration system. This is essential because centrifugal pumps constantly pumping water containing sediment lose their efficiency and a constant check was desired in order to determine when and how often new impellers should be placed in the low service pumps.



INTERIOR OF PUMP ROOM, SHOWING HIGH-SERVICE CORLISS ENGINE.

As a further check on the wastage of water, all water is metered in passing from the high service pump to the storage reservoir and into the mains. This double check on both high service and low service delivery enables a prompt determination of where any leakage occurs and measurements can be taken in order to account for all the water delivered. A universal meter system is being adopted throughout the twenty miles of cast iron distributing mains, in the belief that the only business-like way of selling water or any other commodity is by absolute measurement of the volume.

The purification plant contains a large mixing chamber into which the coagulant is fed with dry-feed chemical machines. The dry-feed machines avoid the trouble of mixing in chemical solution tanks and trouble with agitators in the solution tanks. The sulphate of alumina is fed in pulverized form, going into solution in the mixing chambers. Car-load capacity storage for chemicals is provided on the third floor of the filter house. With the storage and dry-feed machines as provided, the plant is free from disagreeable odors that are not unusual around a water purification plant.

A concrete settling basin was built on a fill placed there by deposits of the creek which had its course over the ground. Information showed that a sawdust mill operated on the site fifty years ago, and this sawdust did not prove, upon sounding, to be a very satisfactory foundation. The settling basin was therefore placed on a large reinforced concrete slab, the reinforcing consisting of seventy-five tons of old steel rails. The basin has been in place about a year and measurements show that the settlement has been less than one-eighth of an inch.

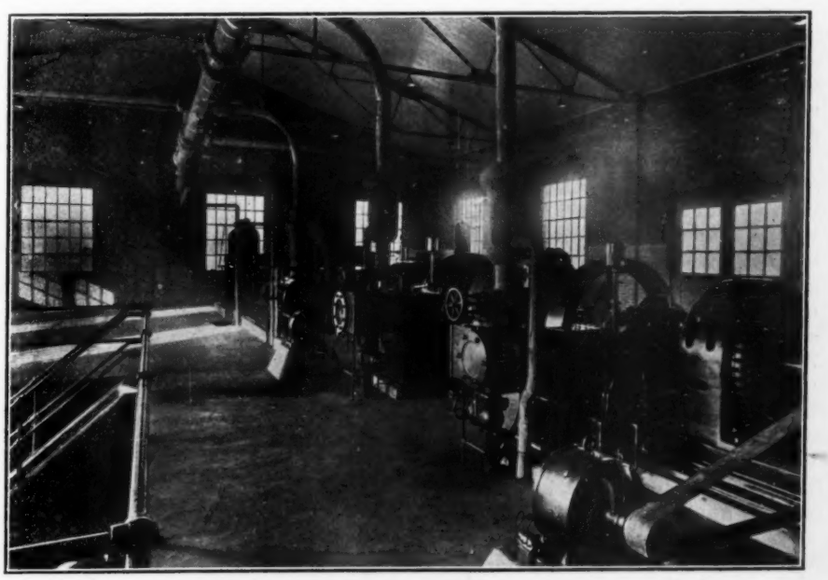
The water flows by gravity from the settling basin into four three-quarter-million gallon filter units which were installed by the Pittsburgh Filter Manufacturing Company of Pittsburgh, Pa. The filters are arranged all in one row in a large, well-lighted room. The filter gallery beneath the filter floor has all of its pipes and valves accessible, with plenty of head-room and working space and with all piping arranged on one side only, which is thought to be a decided improvement in the arrangement of filter piping.

The general construction being of a complicated nature, involving unforeseen conditions, was handled on a cost plus percentage basis by the Wodrich Construction Company of Minneapolis, which plan of handling the work proved very satisfactory.

The pumping machinery and steam power plant equipment was furnished and erected by the Merkle Machinery Company of Kansas City, Missouri, and much of their erection was handled on a cost plus percentage basis.

The filter equipment was handled in a third contract by the Pittsburgh Filter Mfg. Company, and recent tests of the water by the state chemist of Iowa show a reduction of bacteria of 99.75 per cent, the raw water containing 1,600 bacteria per c.c., and the filtered water only 4 bacteria per c.c. Another test that is very important is that for colon bacillus. Three separate and distinct tests have recently been made by the state chemist and no trace of harmful bacteria or disease germs can be found in the water. The only chemical coagulant now used is sulphate of alumina, and the results are so satisfactory from a health standpoint, and also in securing a pure, sparkling water, that the domestic consumption has increased rapidly since the new plant was placed in operation about six months ago. Hundreds of new consumers are being added and the citizens are realizing that with mechanical filtration and the further precaution of liquid chlorine application, an absolutely safe water is furnished at all times.

Seven miles of mains were added to the old distribution system, and by the use of existing gate valves these extensions were added and connections made with but slight interruptions of service in various parts of the residential district. Larger reinforcing mains were laid in the business district and a duplicate supply line reaches from the main pumping plant to the business district of the city. The construction of the distribution system as handled by Stephen Schulte of Fort Madison shows that it is possible to lay water mains and put them in service almost as fast as they are laid, for the corporation was desirous



INTERIOR OF FORT MADISON PUMP ROOM.
Showing Corliss high-service pump and two direct-connected generating units for lighting station and operating low-service pumps.

of securing revenue as each biock of extensions was completed. This was made possible with the plentiful use of gate valves and the prompt making of house-connections before the trenches were filled in.

The entire engineering work, such as plans, specifications and supervision of construction, was handled by Burns & McDonnell, of Kansas City, Missouri, and their supervising engineer, C. E. Painter, has remained in charge of the operation of the plant.

The entire installation, because of its displacing entirely an old and inadequate system and also because of its being the most modern installation in the State of Iowa, has proven of special interest to officials of many municipalities throughout the country, delegations from many other cities having visited and inspected the installation.

The financing and management of the entire project was accomplished by home capital under the leadership and direction of T. T. Hitch, president of the Citizens' Corporation, with the able assistance of Peter Kern, secretary.

Hundreds of water plants throughout the country could profitably carry out similar reconstruction, but unfortunately many owners and operators of water plants, both private and municipal, lack the essential quality of nerve to scrap an old plant when it becomes obsolete.

WATER PURIFICATION IN THE CANAL ZONE.

Spraying Removes Odors and Free Carbonic Acid—Change in Point of Application of Alum Lengthens Filter Runs.

The water purification plants operated by the U. S. Government in the Canal Zone at three points, and known as the Agua Clara, Mt. Hope and Miraflores, were described in Municipal Journal about a year ago and considerable information given concerning their operation. In the report of Geo. C. Bunker, physiologist of the Canal Zone, for the year 1917, some additional and new features are discussed.

At Mt. Hope the water is discharged through 85 cone nozzles adjusted at an angle of 30 degrees with the vertical, the water ordinarily breaking up into fine drops. By this spraying the percentage of saturation of dissolved oxygen is maintained at about from 91 to 94, being increased where the saturation of the raw water is less than this and decreased where it is greater. In addition, a considerable amount of carbon dioxide is removed. An odor of hydrogen sulphide of a numerical value of 5 (Whipple's scale) is completely removed by the spraying action of the nozzles.

During the year the point of application of the alum solution was changed from the discharge end to the inlet end of the aeration basin so that it would be added to the raw water before the latter passed through the nozzles. This change was made in order to remove by aeration the free carbonic acid liberated by the formation of aluminum hydrate, thereby reducing the amount going on the filters and increasing the length of the filter runs. As the amounts of free carbonic acid in the aerated water decreased, the length of filter runs immediately began to increase. The shortest run for any one filter during the ten days prior to the change in treatment was 13.7 hours, and the longest run was 23 hours. During the nine days following the change, the shortest run was 28 hours and the longest run was 59.5 hours. The physical and chemical characteristics of the raw and filtered water remained practically the same immediately before and after the change in the point of application of the alum. The number of micro-organisms and amount of amorphous matter in the raw water did not show any notable variation.

The monthly mean amounts of free carbonic acid in the settled water previous to the change varied from 3.0 in August to 9.0 in March, and the length of filter runs (averages by months) varied from 12.3 in February to 29.3 hours in November. After the change in point of application of the alum, the monthly mean amounts of free carbonic acid varied from 1.5 in May to 7.3 in August, while the filter runs varied from 30.1 hours to 47.6 hours, or the length of run was more than doubled on the average. During the year the number of filter washings was decreased 729, with a resulting saving of 39,639,000 gallons of washing water; the percentage of washing water for the year before and after the change being 5.9 and 3.4 respectively.

At the Agua Clara purification plant an experimental box aerator 4 by 8 ft. and 4 ft. deep, patterned after those used at So. Norwalk, Conn., was built over the inlet of the mixing chamber. The bottom was perforated with ½-inch holes spaced 1½ inches, center to center, and was so located as to give a fall of 4 ft. to the water. A by-pass from the raw water main brings the water up to the top of the box, where it discharges into a trough from which it splashes over and down to the perforated bottom. The alum solution was applied to the raw water at a point about 18 ft. back of the open end of this by-pass, with the idea that the liberation of free carbonic acid due to the formation of aluminum hydrate is effected before the water passes through the bottom of the box. The primary object of this aerator was to remove part of the free carbonic acid so as to reduce the amount of lime which is later applied to the partially settled water. It was found that the aerator resulted in a reduction of the free carbonic acid by from 56 to 76 per cent. In addition, the aerator was of service in removing odors from the raw water.

Prior to the installation of this aerator it had been thought that the rough handling of the initial alum floc would possibly result in a slowing up of the subsequent coagulation in the deposition of a larger amount of suspended matter in the second section of the settling basin. It was found, however, that during the flow in the mixing and distribution channels after leaving the aerator, the floc reassembled in sufficiently large masses to insure the deposition of the greater part of the sludge in the first section of the basin. During the first half of the year an attempt was made to deliver to the filters a settled water of low free carbonic acid and color content. In August, 1916, the iron content of the raw water started to rise from 1.05 parts, and, following heavy rains which washed a considerable amount of red clay into the reservoir, gradually reached a maximum of 3.0 parts in the first part of October. The apparent of the raw water remained at about 65 parts and the true at about 35 parts (filtered through a Berkefield filter) until October, when the former increased to the maximum for the year, 95 parts, and the latter to 45 parts. During this period the alum was maintained at about 360 lbs. per million gallons. In order to reduce the free carbonic acid liberated by this amount of alum and lengthen the filter runs, the amount of lime was gradually increased to 300 lbs. in the last part of August and finally held at about 225 lbs. per million gallons.

The greatest variations in the iron and color of the filtered water occurred at the same time, the former ranging from 0.05 to 0.65 and averaging 0.4 during the weeks of high color in the raw water; and the latter ranging from 1 to 22 parts and averaging 8 parts.

The period of sedimentation was not sufficiently long to properly prepare a raw water of high color and iron

content for later treatment with lime. The amount of color and iron carried over into the second sections of the settling basins by the heavy alum floc was so large that the addition of a sufficient amount of lime to reduce the free carbonic acid to about 1 part and to raise the alkalinity to 20 parts would invariably result in an increase in color in the filtered water through a "fixing" of that mixed with the floc. The weekly and bi-weekly cleanings of the basins seriously interfered with the lime and alum treatment on account of the break in the normal operation of the plant by overloading the other basin and requiring a quick return to service of the cleaned basin. From October 7, 1916, the iron and color of the raw water gradually decreased, the iron dropping to 0.50 part on December 2, and the color to 25 parts three weeks later.

With these reductions in color and iron in the raw water, the alum was reduced to 120 pounds per million gallons, following a similar decrease in color of the raw water to 36 parts. The lime was also reduced from 100 pounds on January 13, 1917, to 25 pounds per million gallons on March 10, averaging 45 pounds during the remaider of the fiscal year.

Starting with the week ending December 2, it was found feasible to neutralize all of the free carbonic acid in the settled water and to add 5 to 10 parts of normal carbonate alkalinity ($CaCO_3$), and at the same time to reduce the color of the filtered water to 7 to 10 parts and the iron to less than 0.3 part. This method of treatment possesses the following advantages:

1. The lengths of the filter runs are increased to an average of 65 hours, and the per cent of wash water reduced.
2. The cost of the operation is reduced.
3. The rate of the corrosive action of the water on galvanized iron and lead pipes is slowed up.
4. The multiplication of bacteria in the second section of the settling basins is limited.
5. A reduction in the bacteria in the filtered water results during the period of storage between the time of pumpage of the water from the plant and its withdrawal from the distribution system by consumers.

The disadvantages are:

1. A faint flat taste results from the removal of all the free carbonic acid, which is not noticed by the average consumer.
2. An excess of normal carbonates leads to the formation of a soft cream-colored deposit in galvanized iron pipes, of which the rapidity of the accumulation increases as the rate of circulation through the pipes decreases.
3. The hardness of the water is increased about 10 parts, making a total hardness of about 26 parts.

From July 1 to August 16, liquid chlorine was applied to the filtered water at Mt. Hope as it flowed from the clear-water basin to the suction well in the pumping station, through a concrete gutter 3 by 3 ft. in section and 12 ft. long, with velocities ranging from 0.4 to 1.5 ft. per second. It was found that the maximum amount which could be applied to the water without imparting a chlorine taste to the water in the distribution system was 1.75 pounds per million gallons, or 0.21 parts per million of available chlorine.

With 1.66 pounds per million gallons, a reduction of bacteria was obtained from 304 to 4 per c. c. in the filtered effluent as collected at the pump discharge, but a multiplication occurred in the distribution system, reaching 100 per c. c. as an average of 90 samples; 2.3 per cent of the samples giving between 500 and 700 colonies.

As in the previous report, attention is called to the negative bacterial efficiency of the filters, the colonies increasing from 286 in the settled water to 304 in the filtered effluent. It has seemed impracticable to keep the filters even approximately sterile for any length of time. Even if the filters were made practicably sterile, it seemed impracticable to obtain sterile wash water, and with the first washing of the filter it was re-seeded. The bacteria that grew in the filter were undoubtedly non-pathogenic. An effort was made to sterilize the wash water by means of chlorine, but this seemed to be impossible without production of taste or odor, and no method has been devised for preventing the multiplication of bacteria in the wash water tank.

OPERATION OF SEWAGE WORKS IN IOWA*

How to Secure Proper Operation of Plants—Supervision by Designing Engineer—Directions for Operators.

BY J. H. DUNLAP†

INSURING PROPER OPERATION.

The important question now remains: What can be done to insure the proper operation of our sewage treatment plants here in Iowa, at present so neglected? It is said that misery loves company. Judging from all accounts, Iowa has plenty of company in its neglect of sewage treatment plants. Our neighboring states are many of them facing the same problem.

Four remedies for the maladies of sewage works in Iowa will be suggested. First, it must be said that no plant can be properly operated unless it is properly designed in the first place. While there seem to be plenty of Iowa engineers who understand the principles of design, yet in the past some irresponsible work has been done. In this regard the Iowa State Board of Health is now rendering a most valuable service to the municipalities of Iowa by its requirement that all plans be stamped with its approval. This is likewise a great service to the sanitary engineers of the state, as indeed they recognize, since it insures work of high grade by all competitors.

Second, with the present requirements of the State Board of Health meeting with such favorable results, it apparently is now time for the Board to add another requirement to its present list, namely, that engineers include in their contracts an agreement to operate for at least one year every sewage treatment plant designed. If this is made a requirement of the State Board of Health, then all engineers will be forced to include in their financial agreements with our towns and cities a sum sufficient to cover the cost of this inspection and operation. If it were not a requirement by the State Board of Health, some engineers might wish to name a fee high enough to include operation, but might find it impossible in the face of competition from other engineers who might feel that this was unnecessary.

By such supervision of operation of each sewage treatment plant for a period of at least one year two results would ensue. One result would be that every new sewage treatment plant would be properly operated during a most difficult period of its existence. A second beneficial result would be that incidentally each engineer would have an opportunity to try out under actual operating conditions all the features of his design. Such experience would prove invaluable. During the year of operation some competent man could be trained properly to care for the plant, make the proper tests, and fill out

*Concluded from page 278.
†Associate Professor of Hydraulics and Sanitary Engineering, State University of Iowa.

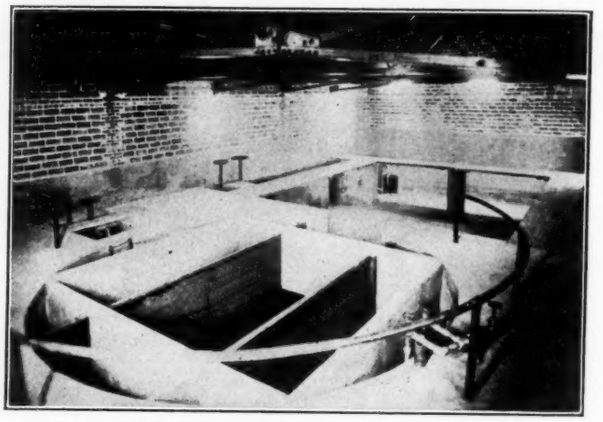
GENERAL VIEW OF PLANT AT WOODWARD.
At left, superstructure over Imhoff tank and siphon chamber; at right, two sand filters.

the proper reports for the State Board of Health. In instructing the local operator of the plant, it must be kept in mind that this individual is a more or less transitory character. Accordingly explicit directions for each detail of operation must be made out and left where they will not be forgotten or lost. Probably the best plan is to have such directions framed and hung in the tool house at the plant. These directions should not neglect some parts of the plant while being very comprehensive about other parts. Some of the engineers of Iowa already are conscientiously leaving such directions. In no case have they been found, however, at the plant itself. In most instances they were filed away by city clerks with other like material and forgotten.

Engineers must remember that the average individual does not understand blue prints. They mean little or nothing to men of the type who will operate the sewage plant. Accordingly a free use of isometric or perspective drawings should be made, as well as of photographs taken during the process of construction. These drawings and photographs, when properly framed and hung in the tool house, would preserve in a form easily understood the essential facts concerning the construction of the plant. This is especially necessary in the case of Imhoff tanks, which are now coming to be so common in Iowa. The average man finds it impossible to understand from blue prints the underlying principles of design and operation of Imhoff tanks. He can learn more from one isometric drawing, or perhaps from one photograph taken at the proper time during construction, than from a whole volume of blue prints.

The chances are that the operator of the sewage treatment plant will have had no technical training whatever. The operators of the 39 sewage treatment plants visited on this inspection trip may be classified as follows: 12 of the plants had no regular care; 8 were in charge of engineers; 6 of the street commissioner; 5 of the city marshal; 4 of the water works superintendent; 1 of the marshal and street commissioner; 1 of the chairman of the sewer committee; 1 of the mayor; 1 of the city clerk. It was found to be too commonly the case that the man supposedly in charge of the plant already had too much municipal work assigned to him to do.

The State Board of Health may render valuable service by preparing and publishing in bulletin form sample directions for the operation of certain plants, representative of general types. One plant differs from another, even of the same type, to such an extent that no one set of directions would apply generally. In order to illustrate what may be done in one actual case, the plant at the State Hospital and Colony for Epileptics at Woodward, Iowa, will be considered. This plant was designed by Lafayette Higgins, civil and sanitary engineer of the Iowa State Board of Health, and constructed in 1916 at a contract cost of $16,000 by the Des Moines Bridge &



VIEW OF IMHOFF TANK AT WOODWARD.
Imhoff tank in foreground, siphon chamber in background. Temporary plank walls through sedimentation chamber to provide for small flow when first operated. Water connections at right. At left of siphon chamber are seen two valve stems, one for by-pass gate, the other for flushing-out pipe.

Iron Co., with the writer as superintendent of construction for the State.

To show how the operator may be assisted in understanding the parts of the tank which are ordinarily out of sight, an isometric drawing was prepared that shows quite clearly the important details of construction. If the photograph of the interior of the superstructure, with the photograph showing the method of constructing the drainage system of the filter and the isometric drawing of the Imhoff tank, is left framed at the plant, the operator will have little excuse for ignorance concerning the fundamentals of his job.

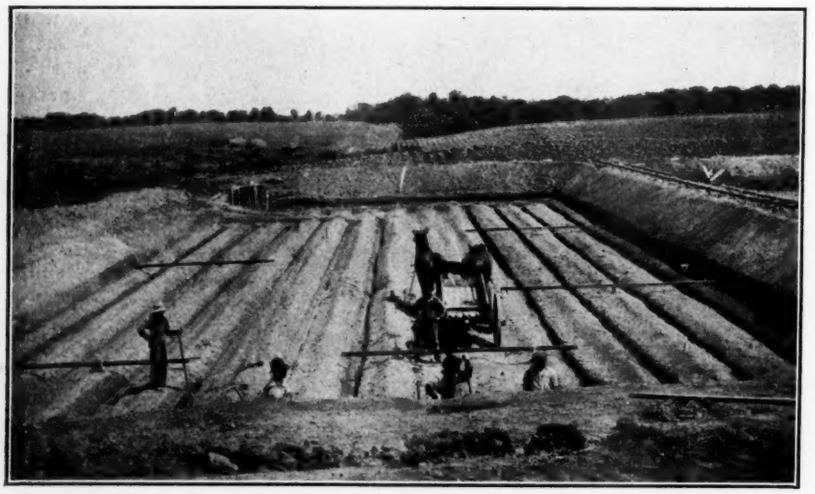
To assist the operator still further, a brief set of instructions should be prepared. The following directions will illustrate what might be done for this particular plant:

OPERATING SCHEDULE FOR THE SEWAGE TREATMENT PLANT, STATE HOSPITAL, WOODWARD, IOWA.

DAILY.

1. Visit the plant.
2. Give every part of the plant careful inspection.
3. Record the amount of sewage flow.
4. Fill out the report blank for the day.

(*Continued on page* 301.)



UNDERDRAIN CONSTRUCTION AT WOODWARD.
Four-inch farm tile was laid in trenches filled with gravel, five feet between centers. Filter sand was two feet deep.

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A. PRESCOTT FOLWELL, Editor
SIMON BARR, Assistant Editor
CHARLES CARROLL BROWN, Western Editorial Representative

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City officials and civic organizations are particularly requested to send to Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

OPERATION OF SEWAGE TREATMENT PLANTS.

The discussion of the operation of sewage treatment plants in Iowa, the third installment of which appears in this week's issue, we consider an important addition to the literature of sewerage matters, especially in that it is derived from personal contact with a considerable number of small plants and the information so obtained has been made the basis of constructive criticism by one who is qualified to offer it. It is one of the most encouraging signs of the past few years that more attention is being paid to the operation of sewage treatment plants as distinguished from the theory of their performance and details of their construction. We believe that the series of articles by Francis E. Daniels on "Operation of Sewage Disposal Plants" that were published by Municipal Journal was among the first and we believe is still the most important of the contributions on the subject; but during the four years since these appeared, plant operation has assumed continually increasing importance in the writings of engineers and sanitarians.

A number of excellent suggestions for securing a more efficient and effective operation of sewage treatment plants are given by Prof. Dunlap in his paper, but one of these seems to us worth especial attention and adoption in some form or other. We refer to the recommendation that the engineer designing a sewage treatment plant should operate the same for one year after its completion. This idea has been advocated by us several times during the past few years, but Prof. Dunlap has added a suggestion which we do not recall having seen before, viz., that this operation be made compulsory by rulings of the state board of health. As he stated, engineers cannot afford to give careful supervision to plants designed by them for a year or any considerable part thereof without receiving some compensation therefor, and unless cities are required to pay the engineer for his supervision it is not probable that they will voluntarily contract with him for it. Making it compulsory to both the city and the engineer that a year's operation of the plant be made a part of the agreement for designing and constructing it, would seem to be about the only method of insuring such supervision, except in those cases where the engineer is able and willing to donate his own time and expenses, or in the exceptional cases in which the cities themselves are willing to pay for this supervision.

To any one who is familiar with sewage treatment plants, and the way in which they are usually run or are allowed to run themselves into total inutility, it must be apparent that operation under the control of an engineer would secure a vast improvement in results in a great majority of cases. The more common practice, especially among the smaller cities, is to turn the plant over to a street foreman or some other official who knows practically nothing about it and cares even less, with the inevitable result that the plant is no more successful than would be a farm which was plowed and seeded in the spring and then left with absolutely no attention throughout the remainder of the year. As a matter of fact, the results obtained from the farm would be proportionally much better than those to be expected from neglected or mismanaged sewage treatment plants.

SEWERS A WAR NECESSITY.

A few weeks ago we gave expression to and explanation of our opinion that the supreme duty of municipalities was to conserve the lives and health of their citizens. This was a general statement and its application was not carried into particulars. To a certain extent, the application must be left for each municipality to decide for itself. There are, however, certain lines along which such conservation must act which are common to practically all communities. One of the most important of these is that of sewers. In a recent letter to Municipal Journal, Surgeon-General Rupert Blue says: "The matter of better sewerage methods is one which has received full attention by this service (the Public Health Service), not only in those cities where our sanitary activities are being conducted, but also in the rural sections surrounding those communities. In fact, one of the most important phases of the work of the service has been in connection with the importance of improved sewage disposal methods. . . . No occasion has been neglected by officers of this service to impress upon the city authorities the importance of the establishment of water-carriage sewage disposal systems. In fact, one of the most prominent activities of the service in all the extra-cantonment zones has been in relation to sanitary engineering. . . . The importance of this matter cannot be over-estimated from sanitary and aesthetic standpoints."

There are a great many cities—more than many of us realize—in which a very considerable percentage of the residences are not connected with the sewers. In some cases, this is because the sewerage system has not been extended into all sections of the city; in other cases, it is because the city has not required property owners to connect their residences with the sewers that have been built. For instance, the commissioner of health of Milwaukee a few years ago reported 1,200 residences not connected with sewers, many because there were none available to them, while only a few days ago the Women's League of Philadelphia reported that scores of houses in one section of that city are on streets where there are no sewers, and the yards of some of these were in such unsanitary condition that they were a disgrace to a civilized community. In the smaller cities this condition is much more common.

That this condition is a cause of sickness and death there can be no question. Facts were brought out in an article in Municipal Journal for August 14, 1913, that showed that in Louisville, Ky., during the previous 30 years the increase in percentage of buildings connected to the sewer system from 15 per cent to 64 per cent had been accompanied by a decrease of almost exactly the same percentage, year by year, in the typhoid fever death rates. Last year the health department of Charleston, S. C., reported that it had caused 946 premises to be connected with the sewers during the previous year and that the typhoid death rate in that city was decreasing, asserting "As sewerage is put in and vaults filled up, so in proportion will typhoid diminish."

Typhoid has heretofore been the most dangerous enemy to be combatted by any army. The deaths among our soldiers from typhoid during the Spanish-American War were many times those caused by the enemy. Both knowledge of how to combat this disease and vigilance in doing so have increased greatly since that time, but every typhoid carrier that joins the army or every typhoid case in the vicinity of the cantonments introduces a possible center of infection for thousands of our boys. The danger is not only that infection will spread from communities in the vicinities of the cantonments, but any city in which there is typhoid is likely to send to the camp an unsuspected typhoid carrier, who, in spite of the greatest vigilance, may cause scores or hundreds of our soldiers to meet death in camp rather than on the battlefield where their deaths might be of service to the country.

The relation between drinking water and typhoid is pretty generally realized; but there are many who seem to be ignorant of the fact that there are at least two or three other sources of the disease which, where conditions are favorable, may be even more fatal than polluted water. Among these may be counted the absence of sewers. Of all public works in charge of city officials, the two which would seem to rank highest in importance are a water supply free from disease germs and the removal of sewage from every section of the city in a safe and sanitary manner. Where either of these conditions is already reasonably well provided for, the other must be ranked as the most important matter before the guardians of the public health and well-being.

SEWER PIPE OBTAINABLE.

Sewer pipe manufacturers, we are informed, have been given permission by the Fuel Administration to use, for the manufacture of such pipe, coal sufficient for fifty per cent of their average production for the past three years. While this is a very material curtailment over demands previous to the war, it is generally acceptable to the manufacturers, who believe that the need of the trade this year will not exceed this amount. (Incidentally, permission is granted to plants manufacturing drain-tiles to operate at full capacity on account of the demand for increased agricultural production.) The Fuel Administration will consider requests of individual manufacturers to increase their rate of production if they find that they cannot supply the demand in their respective territories.

The transportation of the sewer pipe is another factor which limited the output during the past few months, and may interfere with the prompt delivery of this material for some time to come. It is to be hoped, however, that where pipe is to be used for sewers for which a need already exists, the government will realize the importance to the health of the country of having these sewers built and will see that the transportation for the pipe is provided.

COUNCIL BUYS THRIFT STAMPS.

Municipal official bodies throughout the country are demonstrating in various ways their desire to do everything possible to assist the Government in its war program. One of the latest moves that has come to our notice is that of the City Council of Albert Lea, Minn. A few days ago the council members voted unanimously to invest their salaries for the past year in Thrift Stamps and Liberty Bonds, forming themselves into a "City Dad's War Saving Club." On learning this, the mayor, the city attorney, city assessor, and health officer, asked permission to join the club. All of these have, we understand, turned over their salaries for this purpose.

THE COST OF WIDE STREETS.

We wonder what the officials of the average town or small city would say to a proposition that they take care, free of charge, of the yards and private property generally for a width of 40 ft. back from the street line on both sides of the highway; one argument for this being that by so doing they could insure an up-keep of the land adjoining the street that would add to its appearance. We are in doubt whether any such proposition would carry in any city of the country.

Our attention has recently been called to a small city of Arizona, in which the streets are about 150 ft. wide, 100 ft. of this being set aside for a drive-way. The city is now in a quandary as to just what to do with this 100 ft., especially in view of the present high cost of paving materials and difficulty of obtaining them. The best advice that has been offered, apparently, is to pave out 30 ft. from each curb toward the center of the street, and develop the central 40 ft. as a park-way, enclosing this with a curb and planting it with trees and shrubs. "This," says the citizen recommending it, "would be an immediate saving of money and making Mesa a town of novel beauty."

Of this 150-foot street we do not believe that anyone experienced in city planning would suggest that, for a town of this size, there would be needed or desirable more than 40 ft. for roadway and 15 ft. for each sidewalk, or total of 70 ft. The remaining 80 feet are therefore of no service whatever so far as the use of the street for traffic is concerned, and its only value would appear to be as giving more open space for the houses abutting upon it. This 80 feet may therefore be considered as for the private benefit of the residents thereon. For instance, if the curbs of this street were not already set and shade trees planted, an alternative method would be to run a 40-foot roadway through the center of the street, leaving 55 feet on each side for sidewalk space. By omitting fences, as is now common practice, this entire 55 feet, with the exception of 10 to 15 feet paved sidewalk, would be to all intents and purposes a part of the front yards of the properties abutting thereon.

If this space is public property, it must presumably be maintained as such (almost certainly so, if it be placed as a parking in the center of the street instead of on the side); and therefore we have the condition sugested in the first paragraph—that property which is for the benefit of and might as well be owned by the property owners is improved and maintained at the expense of the city at large.

This is only one disadvantage of such unnecessarily wide highways. Another is that a given number of average-size building-lots are spread over twice as much territory as would be required if the streets were of only the width required by the reasonable demands of traffic, thus necessitating a greatly increased length of street and of the distance necessary to travel when passing

from one part of the city to another. Considering that, in combination with this, the streets are approximately double the width that is necessary, we have the city confronted with the expense of improving and maintaining three times as much street area as would be necessary were the street widths reduced to those that are considered adequate and satisfactory by other communities.

OPERATION OF SEWAGE WORKS IN IOWA.

(*Continued from page 298.*)

WEEKLY.

1. Take samples of raw sewage and of tank effluent in the Imhoff conical glasses, and find the per cent removal of solids after 2 hours' settling. It should average 95 per cent.
2. Break up the scum in the gas vents with the hose.
3. Measure and record the depth of sludge in the sludge chamber.
4. Clean the inflow channels and the inlet and outlet weirs.
5. Skim the sedimentation chamber.
6. Squeegee the side walls, aprons and slot. (This may have to be done more or less frequently.)
7. Take a sample of the filter effluent for the methylene blue test for relative stability. When kept at a temperature of 68° F., the blue color should be retained for at least 10 days.
8. Operate all valves.
9. Turn water through the sludge grids for one minute.
10. Fill out report blank to date.

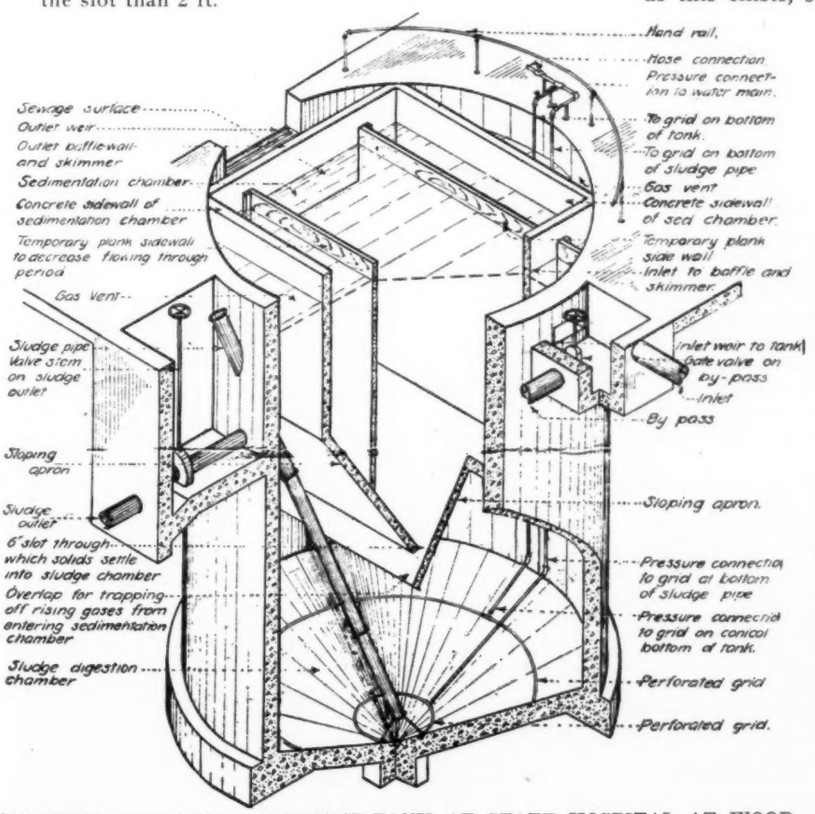
NEVER.

1. Never fill the tank with sewage when empty. Use water.
2. Never unnecessarily agitate the contents of the sedimentation chamber.
3. Never by-pass sewage either at the inlet or from the siphon chamber without recording the reason, date and duration, and notifying the State Board of Health within 24 hours.
4. Never run out large amounts of sludge at a time; better, small amounts every two to six weeks.
5. Never withdraw all the ripened sludge. Some should be left to seed the tank.
6. Never fill the sludge bed to a depth of more than 18 in.
7. Never allow the sludge in the chamber to rise closer to the slot than 2 ft.
8. Never stir the surface of the sand filters to a depth greater than ½ in.
9. Never allow the filter beds to stand flooded.
10. Never by-pass sewage directly to the underdrains by digging holes through the sand.
11. Never allow weeds and grass to clog the surface of the filters.
12. Never add new sand which has not been approved by the State Board of Health.

ALWAYS.

1. Always recollect that the business of this plant is to transform the organic matter in the sewage so that the final filter effluent will be clear and non-putrescible.
2. Always keep in mind that only about 1-3 of the total organic matter settles out in the Imhoff tank.
3. Always remember that the remaining 2-3 must be oxidized by bacterial action in the sludge beds into harmless mineral compounds.
4. Always back-fill the sludge pipe with water, and flush out the pipe running to the sludge bed, after withdrawing sludge.
5. Always clean the surface of the sludge bed before applying a new dose, and add more top sand if necessary.
6. Always make sure that there is enough room in the sludge chamber for the winter sludge.
7. Always note the distribution of sewage over the filters, and if uneven, correct it by re-leveling the beds or re-baffling the distributors.
8. Always keep the filter surface open by raking or harrowing to a depth not greater than ½ in. When this fails to prevent ponding, remove the upper ⅛ in. of sand and surface mat. Not more than 1 in. of sand should be removed in one year.
9. Always give the beds a thorough over-hauling in the late fall just before freezing weather. Pile up the dirty sand in small piles 6 to 8 in. high and 3 to 6 ft. apart. These piles will help support the ice.
10. Always watch for warm days in winter, when the surface of the filters may be put into good condition.

Third (to resume our remedies), it is probably true that final responsibility for the operation of our sewage treatment plants must rest with the State Board of Health. In some instances law suits have forced towns to operate their plants properly. Where no such pressure as this exists, some central authority must be in direct control. A bulletin setting forth, by photographs and by description, the principal facts concerning the operation of Iowa sewage treatment plants would be a real service. Another requirement ought to be regular reports upon blanks made out by the State Board of Health.


Hand rail.
Hose connection
Pressure connection to water main.
To grid on bottom of tank.
To grid on bottom of sludge pipe
Gas vent
Concrete sidewall of sed. chamber.
Temporary plank side wall
Inlet to baffle and skimmer
Inlet weir to tank
Gate valve on by-pass
Inlet
By pass
Sloping apron.
Pressure connection to grid at bottom of sludge pipe
Pressure connection to grid on conical bottom of tank.
Perforated grid
Perforated grid.
Sewage surface
Outlet weir
Outlet baffle-wall and skimmer
Sedimentation chamber
Concrete sidewall of sedimentation chamber
Temporary plank sidewall to decrease flowing through period
Gas Vent
Sludge pipe valve stem on sludge outlet
Sloping apron
Sludge outlet
6" slot through which solids settle into sludge chamber
Overlap for trapping off rising gases from entering sedimentation chamber
Sludge digestion chamber

ISOMETRIC DRAWING OF IMHOFF TANK AT STATE HOSPITAL AT WOODWARD, IOWA.

The Department of Health of the state of New Jersey has prepared space for the record for one month upon one sheet. In the third place, at least annual inspections should be made regularly of all sewage treatment plants in the state. More frequent inspections will be necessary where the monthly reports show poor results are being obtained.

Fourth, in order to make possible this additional supervision on the part of the State Board of Health, greatly increased financial support must be secured from the State Legislature. Time and again attempts have been made to secure adequate legislation to properly finance this work.

The writer cannot close this paper without acknowledging his indebtedness for the generous assistance so kindly extended to him over a period of several years by Lafayette Higgins, civil and sanitary engineer of the Iowa State Board of Health.

The WEEK'S NEWS

State Highway Developments in Oregon and Virginia—United States in Campaign Against Respiratory Diseases—The Dubuque, Ia., Typhoid Epidemic—The New Intake Tunnel of Chicago—Big Calaveras Dam Collapses—Spokane Saves Money on New Street Lighting Contract—Navy Department Calls Philadelphia "Worst City" in Morals—Big Fire in Kansas City Manufacturing Section—City Manager Miller of St. Augustine Resigns—Garbage Disposal in St. Louis.

ROADS AND PAVEMENTS

Emergency Labor Hours on Highway Work.

Salem, Ore.—A. D. Kern, superintendent of construction work on the Columbia highway in Hood River county, has been directed by the highway commission to establish the 10-hour working day and to allow the laborers double time for the extra two hours. The reason for the order is that the improvement has been classed as emergency work. The commission is anxious to complete the work this year, and the fact that the men are constantly quitting work makes it necessary to put the projects in the emergency class. The projects affected are at Cascade Locks, Viento and Ruthton hill. With the pay allowed at double time rate the average daily wage will be about $4.50.

Legislation for Virginia Highways.

Richmond, Va.—State highway commissioner C. B. Scott is greatly pleased at the legislation recently passed by the General Assembly. He said that the needs of the department were fully met by the legislators and everything was provided for. The most important piece of legislation was the acceptance on the part of the legislature of the provisions of the federal aid road act. Together with the federal aid offered, $1,950,000 has been provided for use by the state department. The highway commissioner was also authorized to carry out all necessary plans for the improvement of the state highway. The legislature also adopted the state highway chain of roads, which will provide a connected set of roads through the principal parts of the state. The work of the department will be devoted first to the main arteries of the state, and small county roads will receive last attention. Three thousand five hundred miles of good roads will be provided throughout the state and work on these roads will be of a permanent nature. Another important bill passed was that designating automobile and other vehicle licenses for the upkeep of these roads. All the state convict labor will be put on the construction of the new roads. Heretofore about 1,200 convicts have worked on the roads, but the new law provides for the use of the entire convict force that has been working on the clothing contracts.

SEWERAGE AND SANITATION

Army Begins Campaign Against Respiratory Diseases.

Washington, D. C.—Respiratory diseases having caused practically all the sick and death rate in the nation's new armies, the Medical Corps has begun a nation-wide campaign of prevention against pneumonia, measles, diphtheria, mumps, meningitis, infantile paralysis, influenza and tuberculosis. All of the diseases mentioned are spread or communicated in the same way—through the transfer of nasal and mouth secretions. The sickness rate in camps throughout the country could be cut to the minimum if the soldiers and the general public as well stopped promiscuous coughing, sneezing, and spitting. The difficulty of controlling these diseases lies in the fundamental fact that human beings scatter their nose and mouth secretions without any consideration, despite rules and regulations to the contrary. An official statement says: "Unlike some disease germs, the germs which cause the diseases mentioned do not die or become harmless upon drying. So that when they are dried and blown about with the dust they are still capable of setting up disease in many other people. The problem of the respiratory diseases which confronts Surg. Gen. Gorgas and the Army Medical Corps is serious. Apparently, however, the public generally is totally ignorant of the immeasurable harm that is done through unguarded and promiscuous coughing, sneezing and spitting. Army Medical Corps experts, who have been given untiring study to this problem, have reached the conclusion that a national campaign must be inaugurated at once, not only in the camps, but in the homes, in the offices, in the street cars, and in all public places, to stamp out this widespread habit of spitting and coughing, if health conditions for our soldiers are to be improved." They feel that such a campaign is as important in every way for the object to be achieved as was the now famous and eminently successful fly-swatting campaign which started some years ago. For this reason the Surgeon General therefore appeals to the public to make the "Don't cough, don't sneeze, don't spit" slogan as widely quoted and effective as "Swat the fly." The Surgeon General appeals particularly to the press of the country to help with constant warnings, prominently displayed in their columns, in the form of articles and catch slogans that will serve as a reminder to the public that the health of our soldiers can be better safeguarded through vigilant cooperation in the anti-cough-and-spit campaign.

Typhoid Mixed With Politics.

Dubuque, Ia.—Those opposing the re-election of mayor Saul at the recent election charged that he attempted to withhold the report of the state health department on the subject of the typhoid epidemic until the campaign was over. Jack Hinman, Jr., water bacteriologist, signed, and Henry Albert, director, approved the report. The state investigation traced the epidemic to the city water supply and blamed the turning into the mains of unfiltered river water. The report says:

"The water is derived from a tunnel known as 'The Level,' from a number of six-inch driven wells said to be from 60 to 100 feet in depth, one well eight feet in diameter and 100 feet deep and two artesian wells over 1,250 feet in depth. All of these wells are located at Eagle Point. There is in addition an artesian well 1,300 feet deep. There are also two six-inch suction lines running to the Mississippi river at a point about 400 feet off shore. There are three reservoirs and a stand pipe in use. One of the reservoirs located at the level is nearly fifty years old, but it is in apparent good condition. Another is located at Eagle Point while the third is located on the hills. There is also a standpipe which furnished the hills district and furnishes the pressure for the downtown high pressure system. All of these units are connected, but the water which is used in the stand pipe and the high pressure system is pumped from the level reservoir and contains, under ordinary conditions, a rather large proportion of water from the tunnel. The deficit is made up fom water pumped from Eagle Point. The new reservoir is used to float the low pressure system, any excess pumpage going into the reservoir when it is in use and any unusual demands being met by the water stored here.

"An inquiry as to the source of the water supply used by the twenty-two reported cases of typhoid fever showed that the most of these were supplied by the low pressure system, while two had not had city water in their home. I learned, however, that these two had been in the habit of drinking the city water at the places where they were employed. I examined the water from the wells which they used at home and found them in a satisfactory bacterial condition. One other private well was examined but it had not been used until after the outbreak. This well did not seem to be satisfactory. Except in the case of these three wells there were no other private wells in use among the families of those persons suffering from the disease. There were a few cisterns but in every case the water had not been used for drinking purposes before the outbreak of the epidemic."

"It would therefore seem, on the basis of this investigation, that so far as the water supply is concerned the city water is the only source which can be suspected.

"I learned from the water works men that during the months preceding February 1, more or less untreated water had been pumped into the city mains without any treatment whatsoever. This was most dangerous and in my opinion was the cause of the very serious contamination of your water supply. My recommendations on the basis of my examination and inspection are these:

"1. That no river water be pumped at any time without preliminary filtration or other sufficient treatment and that, in case of an emergency and consequent necessity to use the river water, the public be notified immediately by means of posters and newspaper notices and that they be warned to boil the water until bacterial examinations of water from the dead ends of the mains show that all contamination is removed. With regard to the purification of the river water I would warn you that chlorination of the turbid water, especially in winter time, is not considered satisfactory on the basis of experiment in other localities. The valves on the pipes leading to the river might well be sealed with a lead seal in such a manner that although the valve could be readily opened in a case of emergency the breaking of the seal would testify to the fact.

"2. That the water of the driven wells be not used in its present untreated condition, but that it be treated with calcium hypochlorite or preferably by liquid chlorine in an approved manner before being pumped into the system.

"3. The examination be made of the water from the other sources at frequent intervals, keeping particular watch on the water at 'The Level' since its variation in composition under different conditions is not well known.

"4. That the above mentioned examination be made by some competent local person and that they be supplemented by occasional more complete examinations made by the state laboratories.

"5. That in order to avoid difficulties with odors and tastes arising from the growth of algae in the large reservoir, this reservoir be provided with a cover so that light may be excluded and the gowth of algae be restrained.

Court Scores Health Board.

San Diego, Cal.—Directly criticising the methods of the San Diego health board, federal judge Oscar A. Trippit recently stated from the bench that it is un-American for any one in authority to hold a prisoner apart from counsel and he instructed an attorney to file habeas corpus papers in his court at once for the release of a woman prisoner. The charge was that of maintaining a disorderly house within five miles of a military post. Attorney for the defendant stated that he was not ready for trial as he had been refused the privilege of talking to his client. Shortly after her arrest the woman was released from federal custody on depositing a bail bond, but the municipal authorities of San Diego held her in jail or in hospital as a prisoner for treatment because of her physical condition revealed by Wasserman test. The local health board was not represented in court, but the attorney's statement of the board's refusal of his request for an interview went into the court record.

WATER SUPPLY

Chicago's New $4,550,000 Intake Tunnel Completed.

Chicago, Ill.—The city's new Wilson avenue water tunnel, the first important public improvement built by the municipality under the day labor plan, has been completed. Water will be turned into the great eight-mile bore, May 1. The tunnel cost $4,550,000. It has a horseshoe cross-section, one mile being 13 by 13 feet and the remainder 12 by 12 ft. The bore was constructed through solid rock and has a capacity of 300,000,000 gallons of water a day. It will supply three pumping stations in the northwest section of the city. The land end of the tunnel is at Mayfair, where a new pumping station is nearing completion. The bore extends under the lake three miles and connects with a large concrete intake crib. Work was started on the improvement in 1914 after bids submitted by various contractors had been rejected as excessive. The work was done by day labor under the Department of Public Works, except that a contract was let for the intake shaft and crib, as the city had not the special equipment required for this work in deep water. Day-labor construction of the tunnel was adopted on the recommendation of John E. Ericson, city engineer, and the work has been carried out under his direction. Henry W. Clausen, engineer of waterworks construction, had direct charge. Saving of about twenty per cent in time of construction is thought to have been effected by the introduction of an unusual method of delivering the tunnel rock directly to the concreting plant. Excavated rock was directly transferred from the heading to screening and pneumatic concreting plants traveling on a narrow-gage track in the tunnel. The 3-mile lake tunnel was driven from the shore shaft, with an average haul of 1½ miles. The rock required for the lining of this tunnel amounted to 47,520 cu. yd. This would have required 1,900 trains for transportation, which at the rate of 5 miles per hour would have taken 1,140 hours of work. The hoisting of these 47,520 cars of rock and the lowering of the aggregate would have required about nine months of working time. Adding to this the time saved by reduction of traffic and switching, it is estimated that a total saving of one year may be credited to this new method of working. The construction of the tunnel took exactly four years, from February, 1914, to February, 1918.

Commission Allows Increased City Water Rates.

Great Falls, Mont.—The rates charged by the municipal water plant here have been raised, the state utility commission at Helena having granted the application of the city for permission to make an increase. Commissioner J. H. Hall objected upon the grounds that an investigation should first be made to determine the amount of revenue the city is now deriving from the water department and to definitely ascertain if an increase is necessary. Flat rates are increased 20 cents with corresponding raises on other rates. Irrigation rates are increased from $2.50 to $3 a month. The ten per cent discount for prompt payment of bills before the tenth of the month is retained.

Big Water Supply Dam Goes Out.

San Francisco, Cal.—Work on San Francisco's new water supply in Calaveras valley was delayed a year, half a million dollars damage was done and the surrounding country narrowly escaped devastation when the big dam of the Spring Valley Water Company, seven miles back of Milpitas, near San Jose, went out. The slide was caused, engineers said, by the weight of the clay which is being used to ballast the center of the dam. But for the fact that the slide moved southward, the loss might have been much heavier. It was not the pressure of sixty feet of water in the reservoir which caused the slide, for the earth fell into the water, and not away from it. The dirt blocked the tunnel underneath and preventing a rush of water down on Sunol and the surrounding country to the north. Thirty-eight wagons and a section of the railroad used in the construction work went down among the debris. One-sixth of the total material piled into the dam slid away. The tower contained the mechanism for controlling the flow of water out of the reservoir and this was all wrecked. The dam is a quarter of a mile across the canyon and was 80 feet thick at the top. The top rolled away, leaving an L-shaped gap. The accident was witnessed by Alice Espy, the nine-year-old daughter of constructing engineer T. W. Espy. Being Sunday, the big gang of men employed on the dam was not at work, and because of this nobody was injured. According to John E. Behan, secretary of the Spring Valley Water company, there had been a number of slight indications of ground movement for several days, but nothing severe enough to cause the officials any anxiety. The final movement was rapid, taking place in about five minutes. Attention to the scene first attracted Alice Espy by the wabbling of the tower from side to side, resulting finally in it snapping off and falling as one piece into the lake. She called her father from the house and he saw the final shifting which resulted in the up-stream embankment slipping out. The work was planned to increase San Francisco's water supply and would have cost about $2,500,000. In addition to this the company purchased the entire valley, wrecking a number of homes and a school, and building a new county road. A 48-inch pipe line costing about $8,000,000 will conduct the water into San Francisco when the dam is finished. Calaveras valley was first favorably considered as a dam site in 1864 by Herman Schussler, because of its almost entirely enclosed character. It is a long narrow valley about 18 miles from San Jose and almost due east of Milpitas. The sides and bottom are

practically impervious to percolation, a fact proved by three geologists, headed by Dr. J. C. Branner, who prior to construction on the dam, spent much time investigating the possibility of seepage. Four streams, Calaveras, Ysabel, Honda and Smith's creeks, form the chief water supply. Fifteen years of inspection through all the seasons were occupied in ascertaining definitely the guaranteed flow from these streams, and it was only after all these had been proved to the satisfaction of Spring Valley Water company engineers that the work of construction began. The first work was started about five years ago with the employment of T. W. Espy, present constructing engineer of the company. As many as seven hundred men have been employed at one time since then and the crew has never been less than three hundred. The valley is about seven miles long by a mile wide. On its northern end it narrows into a defile 1,300 feet wide and it is across this point that the dam was being erected to a height of 210 feet. The concrete tower, 235 feet in height, was to contain the mechanism for controlling the outflow of water. The reservoir covers 2,000 acres and has an impounding capacity of 60,000,000 gallons, with a yearly evaporation of not more than five feet over the entire surface. The project will cost $1,500,000. No cement has been used in the structure of the dam and it is said to be the largest of its kind in the world. Ninety-four carloads of concrete have been used, however, to build the drainage conduits.

STREET LIGHTING AND POWER

"Going Value" Not Subject to Taxation.

Trenton, N. J.—A decision has been handed down by justice Black in the state supreme court reducing the tax assessment of the Trenton & Mercer County Traction Corporation by $568,052. The State Board of Taxes and Assessments had held that this assessment on the "going value" of the company for 1916 was legal. In his opinion, judge Black decides that "going value" cannot legally be included in appraising public utility property for tax purposes. The judge held that "going value" is already taxed by a levy on the gross receipts of the corporation.

City Power Furnished to Harbor.

Los Angeles, Cal.—Funds have been provided by the city council for the complete distribution of municipal hydroelectric power at the harbor, by the purchase of $79,000 of the power bond issue of 1914 with sinking fund money. The skeleton of the system, including the high tension feed wires, has already been installed, but the money was lacking to put in the laterals and local distributing wires. The power department will expend $34,000 in extending the system to the fish harbor, and will use the balance of the $79,000 in gridironing the tidelands with service wires. Under a recent order of the mayor and harbor commission none but municipal electric power can be used at the harbor, and as the result it will be necessary to complete the distributing system at once to supply power to the numerous industries which will purchase from the city.

New Street Lighting Contract Cuts Costs.

Spokane, Wash.—Bringing to Spokane a very substantial reduction in street lighting costs and at the same time assuring the installation throughout the city of a greatly improved and much more efficient lighting system, the city council has ratified a contract drawn up on a ten-year basis with the Washington Water Power Company. The new contract is the first to be in operation between the city and the power company for several years. It provides for the replacement of about 1,400 old carbon arc lamps now in use with the latest gas-filled tungsten lamps at no extra cost to the city. The operating cost of the new lights will be $37 each per year, a reduction of $11 per light per year, under the present rate. This, it is figured, will afford the city a saving during the ten years covered by the contract of approximately $200,000. Installation of the new lamps, some of which are now used as an experiment on one street, where they have been fully proven, will begin on or before August 1, and all the old carbon arc lamps must be replaced by January 1, 1919. Mayor Fassett said: "The price for the new lights is lower than obtains in any other city, so far as I am informed. It is 25 per cent lower than is charged the city of Seattle by its own municipal plant. The saving in Spokane under the present price of $4 per month per lamp, amounts to over $15,000 per year at the present time, and, with the addition of new lights during the contract term, will probably make a saving of close to $200,000 during the 10 years. The right of the city to cancel the contract upon equitable terms in case a municipal lighting plant is built, is fully protected." It is provided in the new contract that the agreement may be terminated at any time by giving one year's notice, in the event that the city may wish to operate its own lighting plant. It is also provided that the company may replace the tungsten lamps with new and better ones, at its own expense.

Rates Increased Despite Franchise.

South Glens Falls, N. Y.—The state public service commission for the second district, in replying to a complaint of trustees of South Glens Falls against the United Gas, Electric Light & Fuel Company of Sandy Hill and Fort Edward on gas rates, declares that the condition in the franchise granted by the village is not controlling so as to prevent the commission from authorizing an increase in the rate in the event that the company can justify such increase on the ground that it is failing to earn a fair return upon the value of its property employed in the public service. From the record in this case it appears that the complainants do not propose to contest the increased rate if the decision is adverse to them. The complaint was dismissed.

FIRE AND POLICE

Officials Deny Philadelphia "Worst City" Morally.

Philadelphia, Pa.—"The police force is not only inefficient; it is corrupt; * * * in a time like this it would seem that our fighting forces are entitled to every protection against vicious influences which local authorities can provide. That such protection can be provided has been demonstrated to be practicable in municipalities in every part of the country. Philadelphia, alone among the large cities of the United States, has failed to meet the requirements of the War and Navy Departments in respect to this matter." This is from a statement on vice conditions in Philadelphia issued by Secretary of the Navy Daniels and Raymond B. Fosdick, chairman of the commission on training-camp activities. The city not only is alleged to be fostering vice to a greater extent than any other city in the country, but in the report "responsible city officials" are condemned for obstructing many attempts by Federal authorities to eliminate vice and are flatly accused of "intimacy with those who profit by the continued existence of vicious conditions." The report is the result of a nine weeks' investigation in Philadelphia. This inquiry was conducted by representatives of the commission on training-camp activities, in conjunction with agents of the Department of Justice. In spite of the fact that there are approximately four thousand men on the police force in Philadelphia, and in spite of the fact that they are empowered to close disorderly houses and place the proprietors and women under arrest, the report gives a list of sixty-two of these places in the heart of the city, which were open on March 14 and 15. It further states that this list constitutes only a small fraction of the total number of such establishments now being operated. Liquor is sold in a large majority of them, Mr. Fosdick continues in the report. Many admit men in uniform, and most of the houses situated in the negro section of South Philadelphia cater almost exclusively to sailors. "These houses are run so openly and our investigations have been so comprehensive and long extended, that I can state without hesitation that they enjoy police protection, for which money is paid to police officers." Moreover, the report continues, women ply the main streets of the city in large numbers, and do so by permission of policemen, who are accused of taking part of their earnings for protection. It is charged in the report that the police are in a financial conspiracy with

men who act as walking directories for establishments. They are likewise accused of selling whisky to men in uniform, and licensed liquor dealers are alleged to be indifferent to the traffic. All efforts to arouse the city administration to a sense of its duty toward the situation, according to the report, have failed. Mr. Fosdick states that "it is hopeless to expect any real improvement until the Navy Department takes drastic action to protect men in the service while on liberty in Philadelphia." The report continues: "Reports of our investigators contain instance after instance of action on the part of police officers which has prevented the enforcement of the law against this evil. In virtually every house visited they were informed by the women that they paid weekly sums to the police for protection and that liquor could be purchased in the house. Women on the streets stated that the payment of a weekly sum to the police was necessary to escape arrest."

Basing their wholesale denials on the fact that a number of the addresses given in the federal report are incorrect, city officials and commercial organizations have protested loudly against the charges. Councils adopted a resolution asking the Philadelphia congressmen to demand a congressional inquiry into the Fosdick vice report. The municipal committee of the United Business Men's Association pledged itself to the creation of a metropolitan police force here and urged the mayor and the police department to purge every section of the city of vice. The wartime commission of the Interchurch Federation issued a statement in which it said a survey of the situation here conducted by its agents confirmed the belief that judges and magistrates were lax in the enforcement of the laws and that policemen profited from vice while certain politicians protected it. Mayor Smith and Frank L. Garbarino, special agent of the Bureau of Investigation of the Department of Justice, both toured the central vice zone. They said they found everything "closed" and the streets free from disorderly women. Director Wilson, superintendent Robinson, Charles Lee, head of the vice squad; captain of detectives Tate and division and district commanders held a special conference at City Hall, in which the mayor's orders to keep the city clean were issued. Probation officers of municipal court declared vice has increased 100 per cent. in city, as disclosed in their records of arrest for the last year. The mayor's promise to keep the lid down on the city came after he had personally inspected certain sections of the central police districts. He went in company with Alfred J. Souder, head of his private gambling squad, and Charles Lee, who commands the vice squad. "The streets, I found," he said, "were remarkably free from women who prey on the uniformed man. This is exactly as it should be. The authorities at Washington have maligned and disgraced the city with a report which is not justified, and there is just one way to answer this injustice—keep this city so clean that the rest of the country will have to sit up and take notice. And this is my ambition. Vice is not going to be tolerated in Philadelphia. It must go and stay away. I have formed my own program and it is going ahead as outlined."

Fire Sweeps Manufacturing Section.

Kansas City, Mo.—The fire which destroyed about three city blocks in the wholesale and manufacturing district in the western section of the city, entailing a heavy financial loss, was of incendiary origin, according to James E. Marvin, fire warden. He added, however, that no clew had been found to establish the theory definitely. He placed the loss at between $2,000,000 and $2,500,000. "I grew suspicious when it was called to my attention that the fire had burned 'against the wind,'" Marvin declared. "Almost as soon as the fire was discovered other fires began to break out in adjacent buildings. That would indicate the fires were deliberately started as they were not situated so that sparks from the first fire could have been thrown upon them." Several of the larger warehouses in the vicinity of the fire area contained food. The fire caused many explosions of chemicals and made fire-fighting dangerous. Buildings housing 18 large wholesale and manufacturing firms were destroyed. One fireman was caught under a falling wall and three others were also injured. It developed that the warehouse of the Abernathy Furniture company, where the fire originated, had been locked most of the day and that there had been no employes there for several hours.

Power Plant Wrecked by Fire.

Massillon, O.—A $300,000 fire in early morning wrecked a portion of the plant of the Massillon Electric & Gas Co. completely disabling the machinery. Massillon was left without electric power, a number of plants being idle, throwing several thousand men out of work. Several nearby towns supplied with power from here were also industrially idle and in darkness. The fire was caused by an explosion in the oiling system at the switchboard, it is believed. In addition to industrial plants here being closed down and the town in darkness, Wooster, Dalton, Brewster, Canal Fulton and Navarre, towns receiving power from the local plant, were similarly affected. Firemen had narrow escapes from injuries by falling walls. The company was not able to supply a large number of industries for two days. The generators, turbines and boilers were uninjured.

Vote for Two-Platoon System.

Sioux City, Ia.—Sixteen new men are to be added to the Sioux City fire department immediately, and firemen will only be required to remain on duty 11 hours during the day, or 13 hours at night, according to the decision of the voters at the recent election. The proposition carried by a large majority. The vote on this proposition was light. Many of the ballots were returned unmarked. In some of the downtown precincts the sentiment against the proposed increase showed its greatest strength. A movement to procure the double platoon system was inaugurated by the firemen about two months ago. Their first request was that an ordinance providing for this change be passed by the city council. Later a petition was presented asking for this action by the council or that the matter be submitted to the voters of the city. The council decided to submit the question as a special issue.

GOVERNMENT AND FINANCE

St. Augustine's Manager Resigns.

St. Augustine, Fla.—Eugene Masters, former mayor of St. Augustine, and the first to fill the office of city manager, although temporarily, has been appointed by the city commission to the position of city manager to succeed Winton L. Miller, resigned. When the city manager plan was adopted by the people of St. Augustine in 1915 and before newly-elected commissioners could locate and decide on a permanent city manager, Eugene Masters occupied the position.

Former manager Miller submitted a report on the accomplishments of the city manager administration from July 17, 1915, to March 31, 1918. Some of the achievements mentioned in the report are:

"Most notable of the achievements of your commission during the past two and three-quarter years is the fact that you have held rigidly and consistently to the policy of withholding the making of expensive improvements until there could be developed a definite city plan, comprehending not only the treatment of St. Augustine from the standpoint of beautification and attractiveness to the thousands of annual winter visitors as well as the residents, but including also the utilitarian features. And this policy has been adhered to, notwithstanding the clamor from some sources for so-called permanent improvements, which at best could have been but temporary if such building was to have been haphazard, as must needs have been the case in the absence of a plan comprehending all of the immediate construction needs of the community.

"In this connection, of the most far-reaching importance is the preparation of the St. Augustine city plan, under the charge of the City Plan Board, by the American Park Builders, of Chicago. Not until these plans are laid before the electorate for adoption will the full advantage and vast significance to the future development and welfare of the community be appreciated, and even then much energy must be expended in the campaign of publicity in order to gain a full measure of realization of the vast importance and great value of this city plan.

"As a part of this plan, the studies of and development of complete plans for the extension and betterment of the water

supply, pumping and distributing facilities, and of the sanitary sewer system for the entire city are of immense value, and from the standpoint of a construction program must be undertaken first.

"These two plans, that dealing with the waterworks, by Seabury Gould Pollard, of Cincinnati, and the sanitary sewer design by Alvord and Burdick, of Chicago, are now complete and await only the opportune time for the financing of the construction work proposed.

"Of next greatest importance has been the placing of the city's affairs upon a sound financial basis. Falling gradually behind each year the city had developed to a point where it was a case of government by deficit, and this was leading the city treasury into certain bankruptcy. This policy was at once changed by your commission to a pay-as-you-go policy with the result that the city has not only lived within its income annually but has made a substantial beginning on a sinking fund to retire the $65,000 waterworks bonds at maturity, in addition to reducing a current debt or floating debt of more than $35,000 to $11,000 at the beginning of this year. And during the coming month one-half of this balance will be paid off and the remaining half can be taken up by funds in the sinking fund, to be repaid to the sinking fund in 1918, with interest at 4 per cent. That your financial policy has been sound is best evidenced by the fact that your administration was successful in reducing the interest rate on the current debt 50 per cent., or from 8 and 7 per cent. to 4 per cent.

"Equalization of property values for taxable purposes, one of the first things to receive your attention, has been most successful and of immense importance to all property owners. Changing of tax values ranging from 18 to 70 per cent. of actual values up to full cash or 100 per cent. valuation, and which resulted in a change of the tax roll from $2,005,553 in the first part of 1915 to approximately $10,000,000 in 1916 with a reduction in the tax levy from 30 to 7 mills, was a most important undertaking, and the full value of the equalization will not be realized, perhaps, until special improvement assessments are levied in the future.

"The cleaning of the force-main from the pumping station to the main portion of the city, supplying water for both domestic and fire protection purposes, the capacity of the main having been reduced from 10-inch to 7-inch, due to incrustation, resulted in increasing the flow from 900 gallons to 1,778 gallons per minute, a reduction of 30 per cent. in fuel cost and better fire protection.

"Centralized purchasing of all supplies has always resulted in material savings, although with the constant advancement of prices on all commodities it is difficult to show percentages saved. The ever-increasing cost of all materials and supplies used by the city, like everything which goes into the private business and home, urges a continuation of the most careful buying methods.

"The marsh land survey shows the city as owner of a vast amount of acreage which should be reclaimed when opportune, making provision for additional park space, and also building sites.

"The policy, early inaugurated by your commission, of providing only groceries and fuel actually needed by the indigent of the city has almost eliminated pauperism, as it existed here in the past, which was due largely to the giving of money rather than supplies. Those heretofore thinking themselves dependent upon charity have found themselves, in many instances, able to take care of themselves, and in this they have not only bettered themselves but the community.

"The latter part of 1917 witnessed the city undertaking the sanitary collection service, so as to provide more direct and careful control and supervision, to protect further the public health.

"Ever directing its attention to the matter of providing increased fire protection, especially in co-operation with the Fire Underwriters' Association, with a view not only of keeping down the fire losses, but keeping the city on a first-class rating basis, and reducing or holding down insurance rates, the city by placing the service forces in the fire department in January of this year was able to build up much better protection without adding to the number of men employed in the two departments thus combined. That this change has been for the betterment of the service is best evidenced by the excellent work of the fire department since the first of this year.

"The financial control inaugurated by your administration in keeping with an up-to-date budget system has resulted in an improved method of reporting and recording the financial transactions of the municipality. This will be best brought out in the coming audit, which is certain to show the books in excellent shape, and which will bring out also, I believe, that even our classification of accounts is in almost accurate check with the system devised by the state comptroller, judging from the classification outlined in the state reports for municipalities."

Milwaukee Votes Against Small Aldermanic Board.

Milwaukee, Wis.—By a substantial majority the voters disapproved of the proposal to reduce the common council to a body consisting of six aldermen-at-large and twelve district aldermen, all aldermen to be divided into two groups, each group to be elected for four-year terms at alternate biennial elections. This plan was backed by civic organizations. The voters decided in favor of the plan to have the common council consist of 25 ward aldermen only, elected every four years. Seven bond issues were approved by good majorities, including $200,000 for rebuilding the Sixteenth street viaduct; $350,000 for harbor improvements; $500,000 for new school buildings, additions and sites; $350,000 for two new bridges across the Milwaukee river; $75,000 for public bath houses and $250,000 for a central police station.

Manager Plan Defeated.

Lansing, Mich.—The voters at the recent general election disapproved of the plan to name a charter commission to prepare and submit a new basic law draft, which was to provide for a commission-manager government, by a vote of 2,803 to 2,187, a majority of 616. An amendment to the charter to permit bonding for purchase of public utilities by the city was defeated. The gas and steam-heating plants were particularly aimed at in this. A proposition to return to the old charter in making the mayor's appointments of board members subject to confirmation by the city council was approved.

STREET CLEANING AND REFUSE DISPOSAL

Garbage Collectors Strike.

Trenton, N. J.—After a three-day strike by all the garbage collection employees of the city, the men returned. The 24 men were displeased because two of their number were summoned to police court for disregarding rules and dumping garbage and ashes on a vacant lot. During the strike trucks tried to make collections on the principal streets south of the creek. Residents of other sections of the city were asked by superintendent McClain to remove their garbage and ashes from the sidewalks until collections could be resumed. The strike was ended when the two men were discharged by the judge and they all returned to work.

City Must Renew Garbage Disposal Contract.

St. Louis, Mo.—The Public Service Board decided that the city must renew the garbage reduction contract with the Indiana Reduction Company, for a period of at least two years, before it expires in September. The board is desirous of avoiding a public letting, at which irresponsible and experimental bidders may submit offers for the short-term contract. The Indiana Company is the only one that has successfully reduced the city garbage in the past twenty years without creating a public nuisance, and even it has been the object of many complaints at intervals. The city garbage contractors who established reduction plants at Sands Station, opposite St. Charles, Mo., and Stallings, Ill., were forced by the county courts to close the plants as nuisances. The hog colony on Chesley Island was a constant nuisance to Kimmswick, Mo., and other localities in the vicinity. The service board does not want to let a ten-year contract to the Indiana company because the city administration plans to operate a municipal reduction plant as soon as possible. The Indiana company has agreed to sell its plant near Dupo, Ill., to the city for $336,000, which its officers say is the exact cost of construction five years ago when material was cheaper. The service board a year ago recommended that the city build a new plant within the city limits under the Cobwell patented system, at an estimated expense of $700,000. The city has started a ninety-day experiment with the chemical reduction process patented by Dr. Joseph M. Hirsh of Chicago. An experimental plant has been erected. Dr. Hirsh has agreed to produce salable by-products, from a supply of twenty tons daily of green garbage, that will yield the city more than $3.75 per ton revenue at an expense of not more than 10 cents per ton in chemicals. Director Talbert has recommended to the Service Board that the present high price of grease and fertilizer will compel the city to pay close to $10 a ton for the green garbage to the Indiana Reduction company. The Indiana company recently informed the Service Board that it will co-operate by furnishing the twenty tons of garbage for the daily test, but will ask the city to pay it the approximate value of the by-products in the garbage, about $9 a ton. Grease is now worth 12 cents a pound and fertilizer yields about $20 a ton. It will cost the city about $200 a day to conduct the experiment, Talbert says, and the Hirsh method will have to produce more than three times the stipulated value of by-products to enable the city to break even on the experiment.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading ones published in other countries, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on muncipal matters. In furtherance of this we will furnish any of the articles listed in the index for the price named after each article, except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

ROADS AND PAVEMENTS.

Bituminous.

Bituminous Foundations for Streets and Highways. Advantages of this construction set forth. By L. Kirschbraun. 2 ills., 1,700 words. American City. March. 40 cts.

Relative Efficiency in Methods of Repairs to Bituminous Macadam and Bituminous Concrete Pavements. Paper before American Assn. for Advancement of Science by Geo. H. Biles. 5 ills., 4,500 words. Better Roads & Streets. March. 20 cts.

Efficiency of the Application of Bituminous Materials for Surface Treatments on Gravel and Broken Stone Roads. Paper before Amer. Assn. for the Advancement of Science. By Julius Adler. 2,500 words. Engineering & Contracting. March 6. 15 cts.

Recent Developments in the Construction of Bituminous and Concrete Pavements. Abstract of paper before Amer. Road Builders' Assn. by Chas. M. Upham. 3,500 words. Engineering & Contracting. March 6. 15 cts.

New Features in Bituminous Pavement Practice. Summary of recent development throughout the country. No changes in basic methods. Improvements in methods and materials. By Chas. M. Upham. 3,500 words. Municipal Journal. March 9. 10 cts.

New Features in the Design and Construction of Bituminous Roads and Treatment of Concrete Roads. By Chas. M. Upham. A paper before Amer. Road Builders' Assn. 3,000 words. Canadian Engineer. March 14. 15 cts.

Bituminous Pavements Adaptable to Various Conditions, with Special Reference to Type and Thickness. By L. Kirschbraun. 2 ills., 3,300 words. Municipal Engineering. March. 30 cts.

Bituminous Pavement Foundations. A letter from Geo. C. Warren, recommending their use under bituminous surfaces. 2 ills., 1,400 words. Municipal Journal. March 16. 10 cts.

Brick.

Brick Pavements. A reply to statements of Arthur H. Helder in his article on "Pavements," in the January number of New Jersey Municipalities. By Maurice B. Greenough. 1,800 words. New Jersey Municipalities. March. 25 cts.

New Features in Brick, Wood Block and Stone Block Pavements. Paper before Amer. Road Builders' Assn. By Clifford Older. 3,000 words. Good Roads. March 16. 15 cts.

Concrete.

Concrete Roads for Trucks. General discussion of this type of pavement. 6 ills., 3,000 words. Commercial Vehicle. March 1. 25 cts.

Cost of Constructing Concrete Pavement at Savannah, Ga. Itemized cost of 31,500 sq. yds. laid by city. 500 words. Engineering & Contracting. March 6. 15 cts.

Adopt Belting and Rolling Methods for Concrete Roads. District engineers of Illinois Highway Dept. find differences in practice due to local conditions. By H. E. Bilger. 1,000 words. Engineering News-Record. March 7. 20 cts.

Granite Block.

Present Status of Granite Block Pavements. Paper before the American Assn. for the Advancement of Science. By Clarence D. Pollock. 2,800 words. Better Roads & Streets. March. 20 cts.

Repaving Central Park Transverse Roads. Reclipped granite blocks and cement concrete repaving on heavy traffic roads in New York City. By D. B. Goodsell. 7 ills., 1,500 words. Good Roads. March 16. 15 cts.

Gravel.

The Maintenance of Gravel Roads. Paper before Amer. Assn. of State Highway Officials. By Paul D. Sargent. 1 ill. 2,500 words. Better Roads & Streets. March. 20 cts.

Wood Block.

Causes of Expansion Trouble in Wood Block Pavements in Texas Cities. Result of investigation by C. H. Teesdale, of the Forest Products Laboratory. 4 ills., 1,800 words. Engineering & Contracting. March 6. 15 cts.

Oil for Creosoting Wood Paving Blocks. The Chicago specifications and the injunction suit to prevent their use. Aim to secure unadulterated coal tar distillate. 1,500 words. Municipal Journal. March 30. 10 cts.

Wood Block Pavement on Washington Boulevard. Swelling of blocks and bulging therefrom after several years of service. Author believes character of oil used was responsible. By Chas. C. Brown. 2 ills., 1,700 words. Municipal Journal. March 23. 10 cts.

Foundations.

Substantial Road Foundations Necessary. From a paper before County Commissioners' Assn. by Herbert M. Sharp. 1,000 words. Better Roads & Streets. March. 20 cts.

Drainage.

Improper Drainage the Cause of Most Highway Failures. No hard surface should be constructed until entire road has been under constant maintenance long enough to indicate weak spots. By A. A. Young. 4 ills., 4,000 words. Engineering News-Record. March 21. 20 cts.

Subsurface Water and its Relation to Pavement Troubles. Paper before Indiana Road School by J. L. Harrison of U. S. Office of Public Roads. 3,000 words. Engineering & Contracting. March 6. 15 cts.

Engineering.

Importance of Trained Road Engineers. Speech before Kentucky Road Engineers. By Tom Wallace. 3,000 words. Southern Good Roads. March. 15 cts.

The Ethics of Highway Engineering. Paper before Road Institute of Univ. of North Carolina. By W. C. Riddick. 3,000 words. Good Roads. March 30. 15 cts.

Miscellaneous.

Abandoned Railroad Grade for a Highway. Use of D. L. & W. Railroad right of way is urged. 2 ills., 300 words. Good Roads. March 23. 15 cts.

Construction and Maintenance of Highways Under War Conditions. Paper before the Amer. Assn. for the Advancement of Science. 1,500 words. By Arthur H. Blanchard. Good Roads. March 2. 15 cts.

Highway Problems Considered Under Ten Main Heads. Bond limitations, better drainage, lower grades, traffic study, better types, load limits, safety factors, adequate maintenance, laboratory control and opportunities. From lecture before Road School of Michigan Univ. By H. Eltinge Breed. 1 ill., 5,000 words. Engineering News-Record. March 28. 20 cts.

War Department Favors Road Construction. Statements by Major Gens. W. M. Black and Leonard Wood. 500 words. Municipal Journal. March 9. 10 cts.

Preliminary Work on Provincial Highways. Draining, ditching and examination of bridges. By Geo. Hogarth. 3 ills., 2,000 words. Canadian Engineer. March 14. 15 cts.

Methods of Constructing Roads at Northeastern Cantonments of National Army. Paper before Amer. Road Builders' Assn. by Philip P. Sharples of the Barrett Co. 4 ills., 2,000 words. Engineering & Contracting. March 6. 15 cts.

Methods of Constructing Wagon Roads in Alaska. Permanently frozen material, ice deposits and other unusual problems encountered and methods adopted. 2,200 words. Engineering & Contracting. March 6. 15 cts.

Roads in the Hudson River District with Unusual Construction Features. Description of work by the Palisades Interstate Park Comm. and the New York State Comm. of Highways on the Henry Hudson Drive, the Storm King Road and roadways in the Palisades Interstate Park. Paper before the Amer. Road Builders' Assn. By W. A. Welch. 3,000 words. Good Roads. March 9. 15 cts.

The Highways of the South. Brief statements of work done by southern states during the winter. By Katherine Clemens Gould. 3 ills., 1,800 words. Southern Good Roads. March. 15 cts.

Maintenance.

Maintenance of Earth Roads. Paper before Assn. of State Highway Officials. By John H. Mullen. 4 ills., 2,800 words. Better Roads & Streets. March. 20 cts.

Care in Highway Maintenance. Smoothness of British roads reported by W. V. Sohier. 700 words. Stone. March. 25 cts.

Road Maintenance in Virginia. Paper before Virginia Good Roads Convention. By S. L. VonGemmingen. 2,500 words. Southern Good Roads. March. 15 cts.

Contracts.

Equitable Highway Contracts. Would benefit both parties thereto. Overlooked elements of cost in highway contracting. Classification of materials. Meeting war-time conditions. 3,000 words. Municipal Journal. March 23. 10 cts.

Road Laws.

New Road Laws in Kentucky. 1918 general assembly passes laws for the maintenance of highways, for regulating loads and for making various other changes in the road law of the State. 4,000 words. Good Roads. March 30. 15 cts.

Traffic Regulations in Relation to Road Construction and Maintenance. Paper before Amer. Road Builders' Assn. By W. A. McLean, Deputy Minister of Highways, Ontario. 500 words. Municipal World. March. 15 cts.

Accounting.

Uniform Road Accounting. Essentials of workable system and a description of that used in Wayne Co. concrete road work. By Edw. N. Hines. 2,400 words. Good Roads. March 23. 15 cts.

City Streets.

Street Intersection Signs. Discussion by members of the League of California Municipalities. 800 words. Pacific Municipalities. March. 30 cts.

Dangerous "Safety" Islands. Accidents caused by low visibility of lamp posts and poor shape of islands. Plan proposed for minimizing danger. By G. S. Eaton. 3 ills., 1,000 words. Municipal Journal. March 16. 10 cts.

Elimination of Grade Crossings. Relative advantages of cuts and embankments. Each crossing forms special study. Paper read at conference of Co. Road Supts. By E. R. Blackwell. 4 ills., 1,400 words. Canadian Engineer. March 7. 15 cts.

Laying Utility Mains in Advance of Pavement Construction. Result of an inquiry into methods employed by various cities made by Franklin D. Howell, chief engineer of Board of Public Utilities of Los Angeles. 1,200 words. Engineering & Contracting. March 6. 15 cts.

SEWERAGE AND SANITATION.

Sewerage Terms.

Standard Sewerage Terms and Uniform Definitions. Comment on terms recommended by Amer. Pub. Health Assn. 700 words. Municipal Journal. March 16. 10 cts.

Sewerage Terms. Recommended for adoption as standard by committee of American Public Health Assn. Includes sewerage and sewage disposal. 3,500 words. Municipal Journal. March 16. 10 cts.

Sewerage Designing.

Considerations Affecting the Choice Between the Separate and Combined Sewer Systems. By Paul E. Green. 800 words. Municipal Engineering. March. 30 cts.

Maximum Rainfall Rates. Analysis of rainfall in Philadelphia. 1 ill., 500 words. Municipal Journal. March 23. 10 cts.

Estimating Sewage Flow from Floor Area. Used in districts where day or temporary occupants of buildings exceed residents. Methods of measuring sewage flow. 1,800 words. Municipal Journal. March 30. 10 cts.

Sewer Construction.

Sewer Construction in Tunnel at Hartford, Conn. Method of running tunnel through clay for 1,100 feet. 2 ills., 1,200 words. Engineering & Contracting. March 13. 15 cts.

Difficult Sewer Construction by Sanitary District of Chicago. Brief description of several pieces of work. 600 words. Engineering & Contracting. March 13. 15 cts.

Enlarging Brick Sewer with Concrete. Capacity doubled by raising roof of 11-foot brick sewer. 2 ills., 200 words. Concrete. March. 25 cts.

Construction Plant and Methods Employed on Recent Important Sewerage Work in Illinois. Description of work on sanitary canal, in Chicago, and at Camp Grant. 5 ills., 1,600 words. Municipal Engineering. March. 30 cts.

Sewer Pipe Joints. Materials and methods used by various cities. From discussion by Boston Soc. of Civil Engineers. 1½ pages. Canadian Engineer. March 7. 15 cts.

Reconstructing a Sewer in Tunnel. Enlargement of old 11-foot conduit beneath 50-foot embankment carrying canal. Invert also changed. 1 ill., 800 words. Engineering News-Record. March 28. 20 cts.

Sewer Mains.

Small Sewer Siphon Under Low Head Has Not Clogged. By J. H. Putnam, city engineer, Hattiesburg, Miss. 500 words. Engineering News-Record. March 21. 20 cts.

Outfall Sewer of Poor Concrete Pipe Disintegrates. Cement in section exposed to septic tank gases crumbles after pipe had been in service only two years. By H. L. Sherman. 2 ills., 800 words. Engineering News-Record, March 14. 20 cts.

Service Strength of Sewer Pipe. Standard methods for testing strength of pipe to resist pressure from backfilling sand, two-point and three-point bearings. 1 ill., 1,500 words. Municipal Journal. March 2. 10 cts.

Settlement of Pipe Sewers. May be caused by weight of back-filling and thus occasion leaky joints. 1,000 words. Municipal Journal. March 2. 10 cts.

Sewage Treatment.

Treatment of Sewage by the Activated Sludge Process. Part III. Handling the sludge. 2 ills., 3,300 words. American City. March. 40 cts.

Some Characteristic Design Features of the Northeast Sewage Treatment Works at Philadelphia. Refers to 32 Imhoff tanks. By W. L. Stevenson. 1 ill., 1,000 words. Municipal Engineering. March. 30 cts.

Experiences in Six Years' Operation of Imhoff Tanks. Abstract of paper before New Jersey Sewage Works Assn. describing operation of Madison-Chatham Sewage Disposal Plant. By Paul Molitor. 2,200 words. Engineering & Contracting. March 13. 15 cts.

Disinfection in Philadelphia. Use of liquid chlorine at Pennypack creek sewage treatment plant. 400 words. Municipal Journal. March 16. 10 cts.

Sewage Sludge to be Utilized. Drying beds at Canton sewage works will be cleaned by contractor and sludge disposed of without cost to city. By R. Winthrop Pratt. 800 words. Engineering News-Record. March 14. 20 cts.

Sewage Treatment and Disposal. Discussion of modern methods and sludge utilization. By G. Bertram Kershaw. 3,000 words. Canadian Engineer. March 21. 15 cts.

The Operation of Small Sewage Disposal Plants. Paper before New Jersey Sewage Works Assn. By Geo. W. Fuller. 4,000 words. Canadian Engineer. March 14. 15 cts.

Operation of Sewage Works in Iowa. Conditions found by author at thirty-nine plants. Inefficient operations due to lack of funds, ignorance and carelessness. Sedimentation, septic and Imhoff tanks, sand filters, sprinkling filters and contact beds. By J. H. Dunlap. 5 ills., 2,300 words. Municipal Journal. March 30. 10 cts.

Operating Small Sewage Disposal Plants. Features peculiar to small plants. Recommendations for operation of Imhoff tanks. Foaming, scum prevention and removal. From a paper by Geo. W. Fuller. 2,700 words. Municipal Journal. March 9. 10 cts.

Harbor Pollution.

Sewage Pollution of Boston Harbor. Report of state commission shows gradual increase. Acid treatment of sewage not recommended, chiefly for financial reasons. 2,600 words. Municipal Journal. March 23. 10 cts.

Sanitation.

The Supreme War Conservation. Necessity for municipal sanitation. 500 words. Municipal Journal. March 9. 10 cts.

WATER SUPPLY.

Dams and Reservoirs.

High Multiple-Arch Concrete Dam for Salt Lake City Water-Supply. Washed gravel and sand from excavation used in mixture. Wood forms built in small panels. Cost $100 per acre-foot of storage. 5 ills., 1,700 words. Engineering News-Record. March 7. 20 cts.

Maintaining Reservoirs in Tropical Countries. How reservoirs of the Canal Zone water supply are protected from pollution by trees and undergrowth, grass, aquatic plants, and microscopic organisms. Stagnation and putrefaction in reservoirs. 3 ills., 3,000 words. Municipal Journal. March 9. 10 cts.

Light Equipment Builds Big Reservoir. Brief description of Highland Park reservoir, Michigan. 5 ills., 300 words. Concrete. March. 25 cts.

Cost of Grass Cutting at Impounding Reservoirs, Panama Canal Zone. Itemized costs by month. 1 ill., 1,100 words. Engineering & Contracting. March 13. 15 cts.

Design and Construction of Reinforced Concrete Covered Reservoir. Structure built at Mankato, Minn., in 1916. By H. F. Blomquist. 2,800 words. Engineering & Cement World. March 1. 15 cts.

Results Obtainable in the Use of Concrete in Water Tank Construction. Description of several types of concrete water tanks. By C. C. Whitaker. 9 ills., 2,000 words. Municipal Engineering. March. 30 cts.

40,000-Gallon Concrete Tank Built for $3,100. For the village of New Trier, Minn. 3 ills., 1,500 words. Concrete. March. 25 cts.

Pumping.

Electrification of Lancaster Water Works. Old steam plant built in 1836 gradually replaced by more modern apparatus. New electric plant has twenty-one million gallons high-duty capacity. Description of new equipment. By John T. Brainard. 4 ills., 1,500 words. Municipal Journal. March 16. 10 cts.

Water Pumping by Electric Power. Discussion of characteristics of motor-driven pumps and suggestions for selection of pumps for municipal water pumping. Paper read before Ohio Central-Station Men. By R. L. Yates. 5 ills., 4,000 words. Electrical Review. March 16. 30 cts.

Water-Pumping by Electric Power. Second part of article discussing characteristics of motor-driven pumps and giving suggestions for selection of pumps for municipal water pumping. By R. L. Yates. 5 ills., 2,800 words. Electrical Review. March 23. 30 cts.

Thawing Pipes.

Thawing Services at Lawrence, Kan. Description by supt. of water works of method employed last winter. 700 words. Municipal Journal. March 30. 10 cts.

Thawing Frozen Water Mains. Method of using electricity at North Attleboro for thawing pipes varying in size from small service pipes to six-inch mains. By Wm. Plattner. 2 ills., 1,500 words. Municipal Journal. March 2. 10 cts.

Thawing Frozen Water Pipes by Electricity. How work was done in Passaic, N. J., and general instructions. By Mathew King and Wm. R. Bryans. 2 ills., 1,500 words. Power. March 26. 10 cts.

Thawing Water Pipes by Electricity. Method and apparatus described. By H. D. Rothwell. 4 ills., 1,200 words. Canadian Engineer. March 21. 15 cts.

Conduits.

Lead Wool. Description of use of this material. By R. J. Thomas. 2,000 words. Journal, American Water Works Assn. March. $1.00.

Small By-pass Carried Water Supply After Submerged Break. Braced wood plug reducers between 15½ and 6-inch steel pipe carry 133 pounds pressure. Only 20 per cent capacity reduction. By H. A. Rands. 1 ill., 700 words. Engineering News-Record. March 7. 20 cts.

Leaks from High-Pressure Fire Service Mains. Detailed description of tests on such mains in borough of Manhattan. By Henry B. Machen. 1 ill., 2,100 words. Journal, American Water Works Assn. March. $1.00.

Leakage from Vitrified Pipe used to Convey Water Under a Low Head. Description of tests made by New York Water Department on 18-inch pipe with different kinds of joints. By Wm. W. Brush. 3 ills., 4,000 words. Journal, American Water Works Assn. March. $1.00.

Reinforced Concrete Flumes Poured in 100-foot Lengths. Hub and spigot expansion joints in six irrigation conduits totaling a mile in length have done their work for two years. 3 ills., 700 words. Engineering News-Record. March 21. 20 cts.

St. Louis' New Concrete Water Conduit. Provided to supplement old. Methods of mixing, placing and reinforcing concrete. Creek crossings supported on piles. Equipment used. Contract prices. By W. E. Hardenburg. 3 ills., 3,000 words. Municipal Journal. March 2. 10 cts.

Hydraulic Sluicing for Blanketing Porous Canal Banks. Employed in U. S. Reclamation Service. 1,600 words. Engineering & Contracting. March 20. 15 cts.

Purification.

Coagulation Plant of the Bismarck Water Supply Company. Brief description from report of Alvord & Burdick, engineers. 1,000 words. Fire & Water Engineering. March 6. 15 cts.

Differentiation of Bacteria of the Colon-Aerogenes Family. Result of experiments by the author in distinguishing between them. By Wm. Mansfield Clark. 4,500 words. Journal, American Water Works Assn. March. $1.00.

Chlorination and Chloramine. Description of experiments and results in the use of sodium chloride, caustic potash, sulphuric acid, carbonic acid, sodium carbonate, and sodium bicarbonate on the destruction of B. coli in water. By Jos. Race. 8,000 words. Journal, American Water Works Assn. March. $1.00.

Chlorination at San Diego. Liquid chlorine entirely eliminates colon bacillus from water supply. No typhoid traceable to supply. Difficulties experienced in applying chlorine to water supply and methods of overcoming them. By Wilbur H. Judy. 2 ills., 1,500 words. Municipal Journal. March 23. 10 cts.

Health Board Orders Water Company to Install Filters. Decision of California state board in connection with Los Banos Water Co. 500 words. Engineering News-Record. March 7. 20 cts.

Results of the Chlorination of Public Water Supplies in Michigan. By Ed. W. Rich, State Sanitary Engineer. 1,700 words. Municipal Engineering. March. 30 cts.

Filter Alums Used in Ontario. Analyses in several cities show need of enforcing standard specifications. By G. E Gallinger, A. V. DeLaporte and F. A. Dallyn. 2,800 words. Canadian Engineer. March 21. 15 cts.

Water Filtration Plant at St. Hyacinthe, P. Q. Four units each of one million gallons daily capacity. Central location of office facilitates supervision and operation of plant. Improvements of fire service. By Fred. Elbert Field. 8 ills., 2,800 words. Canadian Engineer. March 14. 15 cts.

Characteristics of a Lime Softening Filtration Plant. Result of experience at the Grand Rapids, Mich., Filtration Plant. By Walter A. Sperry, Chief Chemist. 2 ills., 1,500 words. American City. March. 40 cts.

Reduction of Free Carbonic Acid in Settled Water Increases Length of Filter Runs at Panama. Experiences with three plants told by Geo. C. Bunker, Physiologist for the Canal Zone. 2 ills., 2,300 words. Engineering & Contracting. March 13. 15 cts.

Water Supply Standards and Their Improvement. Statement of standards adopted by several states and the Treasury Department, with comments by the author and discussion by five others. By Wm. J. Orchard. 6,000 words. Journal, American Water Works Assn. March. $1.00.

Waste.

What Becomes of the Water Pumped in Chicago? Discussion of conditions and probable loss by leakage by Chicago Bureau of Public Efficiency. 3,000 words. Engineering & Contracting. March 13. 15 cts.

Popular Objections to Water Metering and How to Overcome Them. Discussion of this subject from a report by

Chicago Bureau of Public Efficiency. 1,700 words. Engineering & Contracting. March 13. 15 cts.

Measures Adopted to Curtail Water Consumption in the City of St. Louis. By Ed. E. Wall, Water Commr. 1,500 words. Municipal Engineering. March. 30 cts.

Legal and Commercial.

Supervision of Public Water Supplies by the Health Officer. General discussion from sanitary point of view. By Jack J. Hinman, Jr. 2,300 words. Canadian Engineer. March 7. 15 cts.

Important Ruling of the Massachusetts Supreme Court on Haverhill Water Regulations. By Albert L. Sawyer. 1,600 words. Fire & Water Engineering. March 27. 15 cts.

Pennsylvania Water Rate Decision. Public Service Comm. supreme in matters of judgment. Ground water, parallel mains, going value, bond discount, reproduction and book costs involved. Municipalities win in Ohio Valley Water Co. Suit. By Farley Gannett. 2,800 words. Engineering News-Record. March 28. 20 cts.

Miscellaneous.

New York Section of American Water Works Assn. Meets. Account of meeting of February 20th. 2,500 words. Fire & Water Engineering. March 6. 15 cts.

New York City's Catskill Mountain Water Supply. Brief comprehensive description by the deputy chief engineer of the department. 34 ills., 7,000 words. Journal of the Engineers' Club of Philadelphia. March. 40 cts.

Annual Report of the Kalispell Water Department. 1,500 words. Fire & Water Engineering. March 20. 15 cts.

STREET LIGHTING AND POWER.

Lighting.

Street Lighting in 1917. Review of developments in the art and practice. Illustrations from more than twenty cities in all sections of the country. 2,000 words. Municipal Journal. March 2. 10 cts.

Modern Electric Street Lighting. Discussion of incandescent and arc lamps from the standpoint of illumination. By S. L. E. Rose & H. E. Butler. 14 ills., 2,400 words. American City. March. 40 cts.

Chicago's New Parkway Lighting System. Method of running circuits and use of series-multiple transformers with special couplings. 1 ill., 600 words. Electrical World. March 9. 15 cts.

An Electrically Illuminated Fountain. Construction and wiring features of a noteworthy installation. New field for outdoor lighting. By A. L. Powell. 7 ills., 2,000 words. Electrical Review. March 30. 30 cts.

Distribution Lines.

Design of Underground Distribution for Electric Light and Power System. Complete analysis of method of preparing a design. By G. J. Newton. 28 ills., 25,000 words. Proceedings of Electrical Engineers. March. $1.00.

Gas Main Suspended Over River. Temporary construction at Tacoma, Wash., where bridge was washed away. 2 ills., 200 words. The Gas Age. March 1. 25 cts.

Power Plants.

New Station No. 5 of the Rochester Railway & Light Co. Hydro-electric generating station of 32,000 horsepower operated to carry the peak loads of combined system. By P. B. Findley. 5 ills., 2,000 words. Electrical Review. March 23. 30 cts.

Output of Large Generating Systems. Great growth in use of central-station energy shown by returns from forty-seven companies in United States and Canada. Increase more than 4,000,000,000 Kw.-Hr. for year. 600 words and table. Electrical World. March 23. 15 cts.

Logic of Public Utility Consolidations. Both physical and fiscal combinations are economical of investment and operating cost and a public benefit. Statistics of progress. Centralized power production. By Clarence E. Fowler. 2,800 words. Electrical World. March 23. 15 cts.

Economies in Central-Station Meter Testing and Repairing. A description of the methods used by the Los Angeles Power Bureau embodying many noteworthy features. By C. W. Geiger. 5 ills., 2,000 words. Electrical Review. March 2. 30 cts.

Interconnection of Electrical Plants in Massachusetts. Spreading rapidly and recognized as an economic movement of great importance. 1,500 words. Electrical World. March 2. 15 cts.

Trend of Public Utility Interconnection. Nation-wide movement toward interconnected generating and transmission systems. 5,000 words. Electrical Review. March 9. 30 cts.

Rates.

Three-Charge System the Highest Development in Public Utility Rate Making. Paper before Illinois Gas Assn. By J. M. Spitzglass. 3,500 words. American Gas Engineering Journal. March 23. 10 cents.

Power Production in War Times. How the cost of coal has gone up and its quality has gone down. Problems of coal delivery and station operation which the power superintendent has to face. Possible economies suggested. By Walter C. Slade. 3,000 words. Electric Railway Journal. March 23. 15 cts.

The Public Utilities and the War. Utilities forming important part in war program while contending with very large increases in operating costs. Need for relief through higher rate schedules. By Chas. W. McKay. 4,000 words. Electrical Review. March 30. 30 cts.

Rates for Public Utilities Service. Paper before Illinois Gas Assn. by J. M. Spitzglass. 4,000 words. Gas Age. April 1. 25 cts.

Miscellaneous.

Girls as Meter Readers. Used in Pueblo, Colo., for reading electric meters, and found more accurate than men. 1 ill., 500 words. Electrical World. March 16. 15 cts.

FIRE AND POLICE.

Fire.

Fire Equipment Statistics. Figures showing fire apparatus, both motor-driven and horse-drawn, in service and reserve in the cities of the United States and Canada of 5,000 population and over. 8 pages. Fireman's Herald. March 2. 10 cts.

Training Firemen for Service. Special training necessary to make efficient firemen. Use of apparatus, physical drill, administration, fire prevention among subjects to be taught. 1,700 words. Municipal Journal. March 16. 10 cts.

Social Aspect of Fire Loss. Discusses personal responsibility for fire loss. 2,500 words. Fire Protection. March. 20 cts.

Police.

Motorcycle Police Sub-stations. Description of a new Detroit police booth. 1 ill., 200 words. Municipal Journal. March 2. 10 cts.

STREET CLEANING AND REFUSE DISPOSAL.

Refuse.

Improved Waste Collection and Disposal Recommended. Three-separation plan for Baltimore. Garbage reduction, rubbish utilization and incineration, ashes for filling. By Walter E. Lee. 1,300 words. Engineering News-Record. March 14. 20 cts.

Refuse Disposal. General consideration; paper before Western Soc. of Engineers. By Rudolph Hering. 2,800 words. Canadian Engineer. March 14. 15 cts.

Recommended Garbage and Rubbish Disposal Methods for Baltimore, Md. As proposed by Walter E. Lee. 1,000 words. Engineering & Contracting. March 13. 15 cts.

Garbage.

Garbage Collection in Chicago. Qualities desired in cans and wagons. Practice in Chicago. Water carriage of garbage. Keep handling at a minimum. 1,000 words. Municipal Journal. March 16. 10 cts.

New York City Has Largest and Best Garbage Reduction Works. Plant with capacity of 1,500 tons a day cuts hand labor to minimum by use of 38 separate conveyors, dehydration, degreasing and tankage drying all done as single process in 199 air-tight reducers. By H. V. Schiefer. 12 ills., 3,000 words. Engineering News-Record. March 21. 20 cts.

Garbage Utilization at Home. Suggests chicken raising by private families. 300 words. Municipal Journal. March 9. 10 cts.

Feeding City Garbage to Hogs. Information and instructions furnished by the U. S. Depart. of Agriculture. Feeding garbage. diseases of pigs and plant layout. 1 ill., 2,200 words. Municipal Journal. March 9. 10 cts.

Garbage Disposal in Columbus. Decreased amount of garbage and decrease of fats in same due to food economizing reduce income from reduction plant. Detail cost of operating plant. Recovering alcohol from garbage. 1,000 words. Municipal Journal. March 30. 10 cts.

Snow Removal.

Methods of Handling Snow Removal Work in Pennsylvania. By Geo. H. Biles. 1 ill., 700 words. Better Roads & Streets. March. 20 cts.

Motor Trucks for Snow Removal Superior to Teams. Discussion before Western Soc. of Engrs. 2,500 words. Engineering News-Record. March 28. 20 cts.

Remove Snow from New York Highways. Recommendation by New York Highway Traffic Assn. or state legislation. 500 words. Municipal Journal. March 9. 10 cts.

Prepare for Next Winter's Snows. Recommends providing in budget and otherwise for removing snows from highways. 600 words. Municipal Journal. March 16. 10 cts.

Keeping Connecticut Roads Open. Description of snow removal work. 1 ill., 500 words. Municipal Journal. March 9. 10 cts.

Methods of Handling Snow Removal Work on Highways in Pennsylvania. By Geo. H. Biles. 800 words. Engineering & Contracting. March 6. 15 cts.

MOTOR VEHICLES.

The South and the Motorist. Popular article. By Geo. W. Sutton, Jr. 1 ill., 1,600 words. Southern Good Roads. March. 15 cts.

Jitneys in Los Angeles Losing. Report of Bd. of Public Utilities shows unprofitable operation on car-mile basis. Many complaints from public. 1 ill., 700 words. Electric Railway Journal. March 9. 15 cts.

Motor Truck Efficiency. Recommendation of standard method of calculating on basis of cost per ton-mile. Effect of road upon efficiency. 700 words. Municipal Journal. March 2. 10 cts.

Motor Truck Parcel Post. Trial trip of 180 miles demonstrates feasibility of hauling mail over highways. Fourth assistant postmaster general describes results of operation at Truck Club dinner. 1 ill., 1,400 words. Good Roads. March 30. 15 cts.

Possibilities of Truck Transportation. Comparison of service rendered by trucks and railroads. 700 words. Municipal Journal. March 2. 10 cts.

Return Loads in Connecticut. Statewide organization for stimulating motor truck freight hauling for short hauls and as feeders for water, trolley and railway lines. 900 words. Municipal Journal. March 16. 10 cts.

Connecticut Establishes First Statewide Return Loads Bureau. Operation of the plan described. 8 ills., 3,000 words. By Joseph Husson. Commercial Vehicle. March 1. 25 cts.

GOVERNMENT AND FINANCE.

City Managers.

City Managers and Their Salaries. A list of all known cities having city managers, with populations, name of manager, when the present incumbent was appointed, and salary paid. Prepared by Harrison G. Otis, Secy.-Treas. of the City Managers' Assn. 1¼ pages. Municipal Journal. March 30. 10 cts.

City Manager Plan, with Proportional Representation for Kalamazoo. By Harry H. Freeman. 700 words. American City. March. 40 cts.

Finance.

Nine Months' Experience with New Jersey's Municipal Finance Laws. Paper before New Jersey State League of Municipalities. By Walter R. Darby. 3,000 words. New Jersey Municipalities. March. 25 cts.

Accounting for Interest and Taxes. Discussion from water department point of view. By W. W. Brush and 5 others. 1,400 words. Journal, American Water Works Assn. March. $1.00.

Miscellaneous.

A Council's Business System. Requirements of Canadian law and suggested system for municipal councils. 3,000 words. Municipal World. March. 15 cts.

The City's Part in the Development and Control of Public Utilities. Paper before convention of New Jersey State League of Municipalities. By Delos F. Wilcox. 5,500 words. New Jersey Municipalities. March. 25 cts.

How Municipal Officials May Assist the Fuel Administration. 1 ill., 1,000 words. American City. March. 40 cts.

Constructive Publicity as an Ally to the City in Securing Good Municipal Ad-

NEWS OF THE SOCIETIES

CALENDAR OF MEETINGS.

April 15, 16.—SOUTHWESTERN ELECTRICAL AND GAS ASSOCIATION. Annual convention, Galveston, Tex. Secretary, H. S. Cooper, Dallas, Tex.

April 15-17.—UNITED STATES GOOD ROADS ASSOCIATION. Annual convention, Little Rock, Ark. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

April 18-19.—BANKHEAD NATIONAL HIGHWAY ASSOCIATION. Annual meeting, Little Rock, Ark. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

April 18-20.—SOUTHWESTERN SOCIETY OF ENGINEERS. Annual convention, Douglas, Bisbee and Tucson, Ariz. Secretary, C. E. Barglebaugh, El Paso, Tex.

April 23-24.—LEVEE AND DRAINAGE CONTRACTORS' ASSOCIATION OF THE UNITED STATES. Conference, St. Louis, Mo. Secretary-treasurer, C. S. Gannon, 421 National Bank of Commerce Bldg., St. Louis, Mo.

April 23-26.—SOUTHWESTERN WATER WORKS ASSOCIATION. Seventh annual convention, Tulsa, Okla. Secretary-treasurer, E. L. Fulkerson, Waco, Tex.

April 26, 27.—AMERICAN ACADEMY OF POLITICAL AND SOCIAL SCIENCE. Annual meeting, Philadelphia, Pa. Secretary, J. P. Lichtenberger, University of Pennsylvania, Philadelphia.

May 7-9.—NATIONAL FIRE PROTECTION ASSOCIATION. Annual meeting, Chicago, Ill. Secretary, Franklin H. Wentworth, 87 Milk St., Boston, Mass.

May 7-10.—CANADIAN GOOD ROADS ASSOCIATION. Annual road congress. Secretary, George A. McNamee, 909 New Birks Bldg., Montreal, Que.

May 13-17.—AMERICAN WATER WORKS ASSOCIATION. Annual convention, St. Louis, Mo. Secretary, J. M. Diven, 47 State street, Troy, N. Y.

May 14.—AMERICAN ASSOCIATION OF ENGINEERS. Fourth annual convention, Chicago, Ill. Secretary, A. H. Krom, 29 South LaSalle St., Chicago.

May 15-22.—NATIONAL CONFERENCE OF SOCIAL WORK.—Annual conference, Kansas City, Mo. Secretary, William T. Goss, 315 Plymouth Court, Chicago, Ill.

May 21-23.—ARKANSAS ASSOCIATION OF PUBLIC UTILITY OPERATORS. Annual convention, Hot Springs, Ark.

June 4-6.—INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS. Annual convention, Chicago, Ill. Secretary, Chief James McFall, Roanoke, Va.

June 4-7.—AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Spring meeting, Worcester, Mass.

June 24-26.—AMERICAN CONCRETE INSTITUTE. Annual meeting, Atlantic City, N. J.

June 25-28.—AMERICAN SOCIETY FOR TESTING MATERIALS. Annual meeting, Atlantic City, N. J. Secretary-treasurer, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

June 26-28.—AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Annual convention, Atlantic City, N. J. Secretary, F. L. Hutchinson, 33 West 39th St., New York City.

American Society of Mechanical Engineers.

The annual meeting of the American Society of Mechanical Engineers will be held on Thursday morning, June 6, at the Worcester Polytechnic Institute at Worcester, Mass. "Fuel Economy" will be the vital theme of the meeting. Discussion is requested on the following topics: What are the economic effects of impurities in coal? To what extent is fuel oil likely to be used as a substitute for coal? How can soft coal be burned without smoke in marine boilers? What are the possibilities in the direction of the utilization of anthracite wastes? What instruments are useful and desirable in the boiler room as aids in saving coal? What is essential to the economical operation of hand-fired boiler furnaces when using soft coal? To what kinds of plants and coals are the different types of mechanical stokers respectively adapted and what is the limiting factor to their use in the small plants? What experience have you had in the use of wood as fuel? To what extent is wood available as fuel? What coal economies can be effected in residence heating? What coal economies can be effected in small steam plants? What experiences have you had with the storage of coal? While the above topics are all that can be suggested for discussion, additional short papers on any fuel topic are requested for publication. Items of interest on fuel performance should be sent to the secretary of the association.

American Society of Civil Engineers.

The American Society of Civil Engineers has decided again to abandon its annual convention. The reasons given for this action are the absence of many members in the service of the country, the inappropriateness of social functions at this time, the limitation of transportation facilities and the advisability of economy along all lines.

Canadian Society of Civil Engineers.

Fuel and power problems in Canada were the subject of discussion of the recent professional meeting of the Canadian Society of Civil Engineers, held in Toronto. About 150 attended. Special emphasis was laid by the speakers upon the need of developing Canada's fuel resources.

The opening address was delivered by Sir William Hearst, Premier of Ontario, who reviewed the action taken by the provincial government to relieve the fuel shortage and promote the development of the peat industry. B. F. Haanel, chief of the fuel division of the Canadian department of mines, delivered a thorough address embodying estimates of the peat and coal resources and dealing with processes for preparing peat and lignite for fuel.

Transportation was discussed by W. N. Neil, secretary of the Canadian Railway Association, who described the difficulties the railways had to contend with in connection with fuel shortage and the great economies already effected. W. J. Dick, mining engineer of the commission of conservation, urged that the area served from the coal fields of western Canada could be considerably enlarged by special railway rates, and suggested a pooling of interests by the mines to secure more of the division of fuels of the Mines economic development. John Blizard, Department, described the process of producing a commercial fuel from peat. E. Stansfield, of the mines branch, dealt with the briquetting of bituminous coals.

The addresses delivered on the second day dealt principally with the development of water powers to provide hydro-electric power as a substitute for coal. Among those who treated of this question were J. B. Challies, of the Department of the Interior; J. M. Murphy, chief electrical engineer of the Department of Railways, and P. H. Mitchell, Toronto. Albert Grigg, deputy minister of lands and forests for Ontario, spoke of what the province was doing to supply wood fuel.

National Electric Light Association.

The National Electric Light Association will hold another war convention this year, the meeting to take the form of a serious business session, at which many of the important problems confronting utility companies will be discussed.

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PERSONALS

The twentieth anniversary of the firm of Burns & McDonnell, consulting engineers of Kansas City, Mo., was celebrated April 1. Besides the original members of the firm, C. S. Burns and R. E. McDonnell, they have associated with them as members of the firm Captain C. A. Smith, R. L. Baldwin, L. B. Reynolds and C. F. Lambert. The firm will continue to specialize in municipal engineering and appraisal work.

Smith, Chester A., member of the American Society of Civil Engineers, and associate member of the firm of Burns & McDonnell, consulting engineers of Kansas City, Mo., has accepted the appointment as captain in the Sanitary Corps of the National Army and has reported for service at Fort Oglethorpe, Georgia, his work being under the department of the Surgeon-General of the National Army. Captain Smith is 36 years of age, is a graduate of Kansas State university, and has been nine years with the firm of Burns & McDonnell, consulting engineers, in which work he has had extensive experience in water works and sanitation.

The following officials have been elected:

Waterloo, Ia.—Mayor, R. C. Thompson; engineer, W. D. Johnston; river front commissioner, R. A. Ellis; park commissioner, R. Leffler.

Keokuk, Ia.—Mayor, Ed. S. Lofton; commissioners, T. J. Hickey and D. J. Hemmy.

Sioux City, Ia.—Mayor, Rev. Wallace M. Short.

Des Moines, Ia.—Mayor, Thomas Fairweather.

Cedar Rapids, Ia.—Mayor, J. F. Rall.

Burlington, Ia.—Mayor, James M. Bell.

INDUSTRIAL NEWS

Cast Iron Pipe.—Government prices remain constant, but it is believed that pipe manufacturers will soon meet to decide on new prices. Quotations: Chicago, 4-inch, Class B and heavier, $57.30; 6-inch, $54.30. New York, 4-inch, Class B and heavier, $58.35; 6-inch, $55.35; 3-inch, $65.35. Birmingham, 4-inch, Class B and heavier, $52; 6-inch, $49; Class A, $1 extra.

The Layne & Bowler Co., Memphis, Tenn., has just issued a striking 64-page bulletin dealing with "Railway Water Supply." The subject of screens for wells is taken up with interesting and convincing detail and the different types made by the company are described and their advantages for various purposes enumerated. The work of Layne and Bowler as developers of ground work supplies is described and the guarantee contracts discussed. Another section takes up the Layne vertical turbine pumps, their construction, operation and interesting installations. Useful information in the last section includes hydraulic tables, handy data on derricks, pipe and casing. The book is a splendid example of beautiful printing, both in typography and illustration. Every point and type of equipment is clearly pictured with photograph and diagram. The book, which should be on the desk of all interested in water supply for railways, is for general distribution.

The International Motor Company, New York, N. Y., has issued a number of attractive bulletins discussing the various types of Mack trucks and illustrating the variety of service they are giving. One set of bulletins describes the model "AC" 3½, 5½ and 7½-ton trucks and another set the model "AB" 1, 1½ and 2-ton machines. Full specifications and descriptions of parts are presented, together with innumerable illustrations of machines, making an impressive display of Mack service.

The American-La France Fire Engine Co., Elmira, N. Y., has recently received the following orders: Baltimore, Md.—2 type 14 chasses, 1 type 20 combination chassis, 1 type 12 piston pump engine, 2 type 75 piston pump engine; Casper, Wyo.—1 type 12 combination with junior pump; Cheyenne, Wyo.—1 type 31 truck tractor, 1 type 40 combination; Dubuque, Ia.—1 type 31 75-ft. aerial truck; Fresno, Cal.—1 type 14 combination service truck; Hampstead, Md.—1 type 40 combination with junior pump; Martinsburg, W. Va.—1 type 12 pumping engine; Miles, Mont.—1 type 40 combination chemical engine and hose car; Mishawaka, Ind.—1 type 40 combination chemical engine and hose car; Mount Pleasant, Ia.—1 type 40 combination chemical engine and hose car; Muskegon, Mich.—1 type 75 pumping engine, 1 type 17 4-truck tractor; Seymour, Conn.—1 type 75 pumping engine; United States Government—Tuberculosis Hospital, Otisville, N. Y., type 10 pumping engine; Clearing Hospital, Rose Bank, S. I., N. Y., 1 type 75 pumping engine; General Hospital No. 3, Rahway, N. J., 1 type 75 pumping engine; Watervliet Arsenal, Watervliet, N. Y., 1 type 75 pumping engine; Waterbury, Conn.—1 type 75 pumping engine, 2 type 33 service trucks; Wheeling, W. Va.—1 type 12 pumping engine, 2 type 75 pumping engine, 1 type 14 combination service truck; White Plains, N. Y.—1 type 75 pumping engine; Windber, Pa.—1 type 75 pumping engine, 1 type 75 combination with junior pump.

Government Prices on Ore, Coke and Steel.

The Council of National Defense has authorized the following statement: "The President has approved the recommendation of the price-fixing committee of the War Industries Board that the maximum prices heretofore fixed by the President upon the recommendation of the board upon ore, coke, steel, and steel products, subject to revision on April 1, 1918, be continued in effect until July 1, 1918; from April 1 to July 1, however, the maximum price of basic pig iron be reduced from $33 to $32 per gross ton, and that the maximum price of scrap steel be reduced from $30 to $29 per gross ton. No new contracts calling for delivery of any of said commodities or articles on or after July 1, 1918, are to specify a price unless coupled with a clause making the price subject to revision by any authorized United States Government agency, so that all deliveries after that date shall not exceed the maximum price then in force, although ordered or contracted for in the meantime.

"It is expected that all manufacturers and producers will observe the maximum prices now fixed."

The Asbestos Protected Metal Company, Pittsburgh, Pa., announces the appointment of Herbert Longstaff as manager of its St. Louis office, located in the Boatman's Bank building.

Belgian Firm Wants Machinery Catalogues.—A Belgian colonial firm wishes to receive catalogues from American manufacturers of mining machinery (rails, ore cars, tools, furnaces, motors, pumps, etc.), hydraulic mining machinery (nozzles, monitors, gravel pumps, ejectors, sluices, etc.), hydroelectric machinery (water turbines, dynamos and electric wiring for transmission of power), motor trucks and tractors. The Belgian firm understands that under existing circumstances it may be difficult to quote prices, according to a statement made to the Bureau of Foreign and Domestic Commerce by the Belgian consul-general at Chicago, but desires to study American designs, reserving the question of price for such time as orders may be placed. It would find last year's catalogues satisfactory. The name of the firm may be obtained from the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C. (Refer to file No. 8325.)

American Fire Apparatus in Japan.—An evidence of the international reputation of American-made motor fire apparatus is apparent in the recent shipment of three motor hose cars to Japan by the American-La France Company. All three units were mounted on Goodyear cushion fire-truck tires.

NEWS OF THE SOCIETIES

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Sessions will be held on two days. The place of meeting has not yet been decided, although it is assured that some point in the Middle West, outside of Chicago, will be selected. No decision has been reached regarding date of the meeting except that it will be some time between May 15 and June 15, depending on accommodations that can be secured.

Walter Neumuller, of the New York Edison Company, has been appointed chairman of the convention committee. Announcement has been made that there will be no entertainment features, and no inducements will be offered ladies to attend.

Engineers' and Architects' Club of Louisville.

The March meeting of the Engineers and Architects' Club of Louisville was held on the 19th. The following papers were read: "The Road Situation in Kentucky," Rodman Wiley, state commissioner of roads; "The Relation of Traffic to the Type of Road," W. F. Brooks, U. S. senior highway engineer; "Selection of Type of Road to Build," R. C. Heath, road engineer, Dept. of Public Roads of Kentucky (formerly with Massachusetts highway commission).

Indiana Sanitary and Water Supply Association.

The eleventh annual convention of the Indiana Sanitary and Water Supply Association opened March 26 at the Claypool Hotel, Indianapolis, with about one hundred engineers and health officers from various parts of the state attending.

Dr. W. F. King, assistant state health commissioner, president of the association, said in his annual address that the organization has been largely responsible for many of the improvements made in water supply conditions in Indiana during the last ten years. The association, he said, has been one of the important factors in procuring legislation looking toward the purification of water supply, fire prevention, the regulation of public utilities by a commission and flood prevention.

There was a round-table discussion on the subject of "Proper Installation and Care of Meters and Services." The members of the association were guests of the Indianapolis Water Com-

pany at a buffet luncheon at the company's Riverside plant at noon, where a short talk was given by George L. Mackintosh, president of Wabash College.

The program for the afternoon session included the reading of papers by W. H. Durbin, engineer of the Indianapolis sanitary commission; Philip Burgess, of Columbus, O.; George W. Bach, member of the war service commission of the American Boiler Manufacturing Association, and L. D. Grisbaum, of Indianapolis.

A vigorous appeal that nothing be permitted to interfere with the installation of a sewage disposal plant in Indianapolis was made by Dr. J. N. Hurty, secretary of the state board of health at the second day's meeting. Dr. Hurty's remarks followed the reading of a paper, entitled "Sewage Disposal for Indianapolis," by George W. Fuller, a consulting engineer of New York, and expert adviser for the sanitary commission of Indianapolis. Mr. Fuller explained the proposed plan under which the plant would be operated. Dr. Hurty said he had been informed recently that an organized effort is under way in Indianapolis to kill the effectiveness of the sanitary commission law by amending it at the next session of the legislature. It was Dr. Hurty's opinion that any movement of this kind should be fought to a finish.

Difficulties which many filtration plants have encountered in getting alum and chlorine caused the meeting to pass resolutions asking that the authorities give these articles a priority rating. Many times, it was declared, chlorine has had to be shipped by express from Niagara Falls to Indianapolis, and the Terre Haute plant found it necessary to get alum the same way from Joliet, Ill. The chemical company at the latter point has found it extremely difficult at times to get cars in which to load bauxite at its southern mine. To remedy part of the difficulty the Electro-Bleaching Gas Co. has established a distributing warehouse at Joliet, Ill., for it can get carload shipments on a single priority order and avoid delay by sending a man with the car. Plants using these chemicals are urged to set forth their requirements to the proper authorities in their respective states. W. S. Cramer, Lexington, Ky., informed the members the situation had become so acute that the American Water-Works Association would soon have a representative in Washington to look after this and other problems confronting waterworks officials.

Municipal ownership of electric light and water plants was favored in a paper by F. T. Schultz, superintendent of the municipal plant at Columbus City. Mr. Schultz strongly advised the establishment everywhere of the meter system for water service, as, he said, the meter prevents waste and reduces the expense of operating the plants.

Abolishment of private wells in all municipalities was advised by W. C. Duncan, of Columbus, Ind., in an address at the closing session of the meeting, March 28. The association was greatly interested in a paper by Dwight S. Ritter, city purchasing agent of Indianapolis, who spoke on "Some Problems in City Purchasing."

A round-table discussion on "Public Service Investment in War Times" was conducted under the direction of J. B. Marvin, consulting engineer, of Frankfort, Ind. It was the consensus of opinion that the public utility companies should not seek to escape their responsibility for helping the war along on account of their loss in net earnings or through special taxes. Dr. J. N. Hurty, state health commissioner, discussed some of the lessons which may be learned from the physical examinations of soldiers.

Officers of the association were elected as follows: President, Dr. W. F. King, of Indianapolis; secretary-treasurer, W. G. Ulrich, of Indianapolis; assistant secretary-treasurer, J. A. Craven, of Indianapolis, and vice-presidents, J. W. Toyne, of South Bend; S. C. Geupel, of Evansville; Howard Dill, of Richmond, and E. C. Burch, of Washington.

MUNICIPAL INDEX

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ministration. With particular reference to methods for securing publicity. By Jesse Lee Bennett. 3,000 words. New Jersey Municipalities. March. 25 cts.

MISCELLANEOUS.

City Planning.

Effect of Boulevard on Property Values. Philadelphia boulevard increases values over 20 sq. miles. 350 words. Municipal Journal. March 2. 10 cts.

Landscape Architecture. Its relation to civic development. By Arthur H. Helder. 2,500 words. New Jersey Municipalities. March. 25 cts.

Significance of New Laws Relative to Zoning and Set-back Lines. General discussion by author and members of the society. By Albert Lee Stephens. 3,000 words. Pacific Municipalities. March. 30 cts.

Report of City Planning Committee. American Water Works Assn. committee presents illustrations, with brief descriptions, of water works structures and grounds. 8 pages, 12 ills. Journal, American Water Works Assn. March. $1.00.

Construction.

Ditching with Dynamite in Wet Soil. Description of work done by Federal Govt. in the South. 700 words. Municipal Journal. March 30. 10 cts.

Lowering Ground Water Levels. Brief discussion of facilitating excavating trenches in wet ground. By Clarence L. Kirk and 5 others. 1,350 words. Journal, American Water Works Assn. March.

Contracts.

Cost-Plus-Fee Contracts with Divided Risk. Plan to be tried by Kansas City, Mo., in building viaduct. 500 words. Engineering News-Record. March 7. 20 cts.

Gambling Bids. Editorial comment on unbalanced bid for paving submitted in Boston. 1,000 words. Municipal Journal. March 30. 10 cts.

General.

Collapsible Form of Manhole Guard. Features of wooden manhole guard employed by Cleveland Electric Illuminating Co. By E. E. Noble. 4 ills., 700 words. Electrical Review. March 30. 30 cts.

Report on Rapid Transit System for Detroit. The full text of the report by Barclay Parsons & Klapp recommends partnership arrangement with D. U. R., flexible fare and combined subway and elevated structure. 6 ills., 2,700 words. Electric Railway Journal. March 2. 15 cts.

Convention of Alberta Assn. of Local Improvement Districts and Rural Municipalities. Account of convention held February 6 to 8. 10,000 words. Western Municipal News. March. 15 cts.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Bloomington, Ind., is to improve its WATER SYSTEM. The engineer for the work is C. H. Hurd.

Ford City, Ont., is to construct a SANITARY SEWER. The engineer for the improvement is O. McKay.

The city of Shreveport and Caddo county, La., are jointly to build a $100,000 BRIDGE. Plans for the structure have been completed by the consulting engineering firm of Waddell & Waddell.

A SEWAGE DISPOSAL SYSTEM is to be built by Paulsboro, N. J., at a cost of $100,000. The consulting engineering firm of Remington & Vosbury are at work on the project.

Cambridge, Mass., is to repair its RESERVOIR at a cost of about $90,000. Plans and specifications for the work were prepared by the consulting engineer, George A. Johnson.

Phillipsburg, N. J., is to construct SEWAGE TREATMENT WORKS. The consulting engineering firm of Fuller & McClintock had charge of the preparation of plans for the work.

WATERWORKS and SEWERAGE improvements are to be made by Ogden, Kans. Plans and specifications for the work were prepared by O. E. Noble.

SEWERS are to be constructed by Hamtramck, Mich., following the completion of plans, which are now in progress, by the engineer, George Jerome.

A FILTRATION PLANT to cost about $160,000 is to be built by Whiting, Ind. Plans are in course of preparation by the consulting engineering firm of Pearse & Greeley.

Richmond, Ind., through the Commercial Club, has been considering the problem of adequate SEWERAGE for the city. H. N. Logan, sanitary expert, has submitted a report on conditions and possibilities.

The U. S. Department of Labor is to spend about $60,000,000 on the HOUSING PROJECTS under its control. John W. Alvord, as consulting engineer; Frederick Law Olmsted as city planning expert, and Burt L. Fenner as architect have been retained to constitute an advisory board.